Chemical Age

MORE I.C.I. TRADE WITH SOVIET BLOC?
(page 851)

VOL. 82 No. 2109

12 December 1959

THE WEEKLY NEWSPAPER OF THE CHEMICAL INDUSTRY

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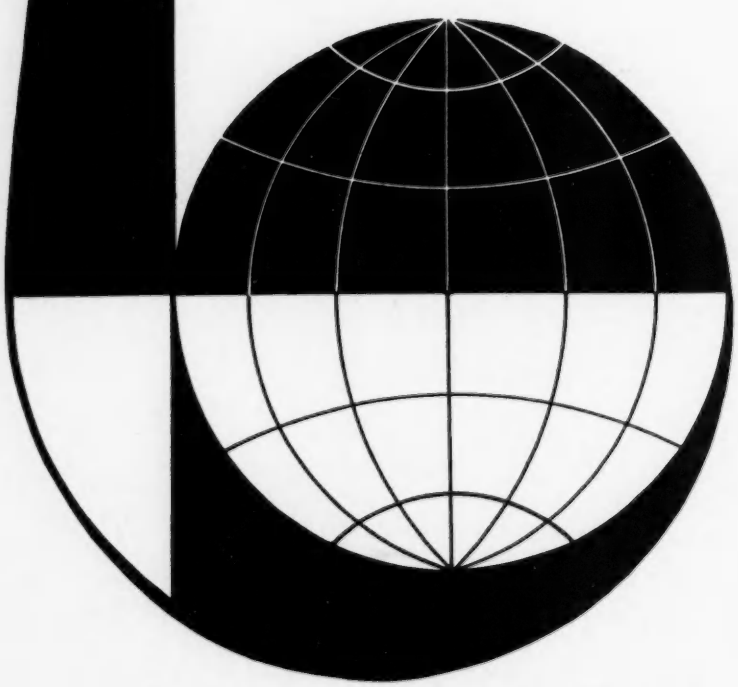

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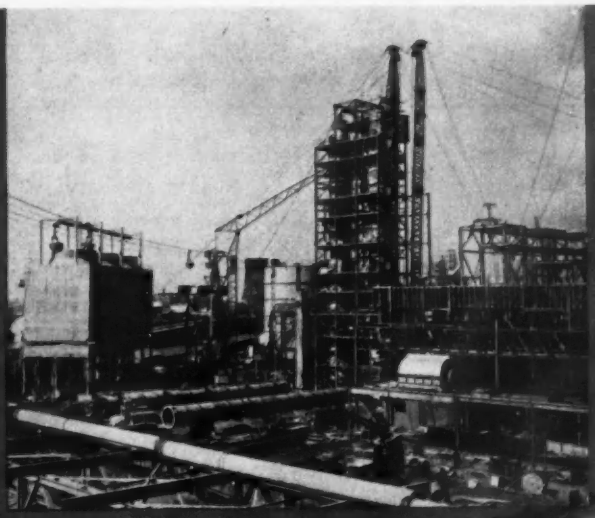

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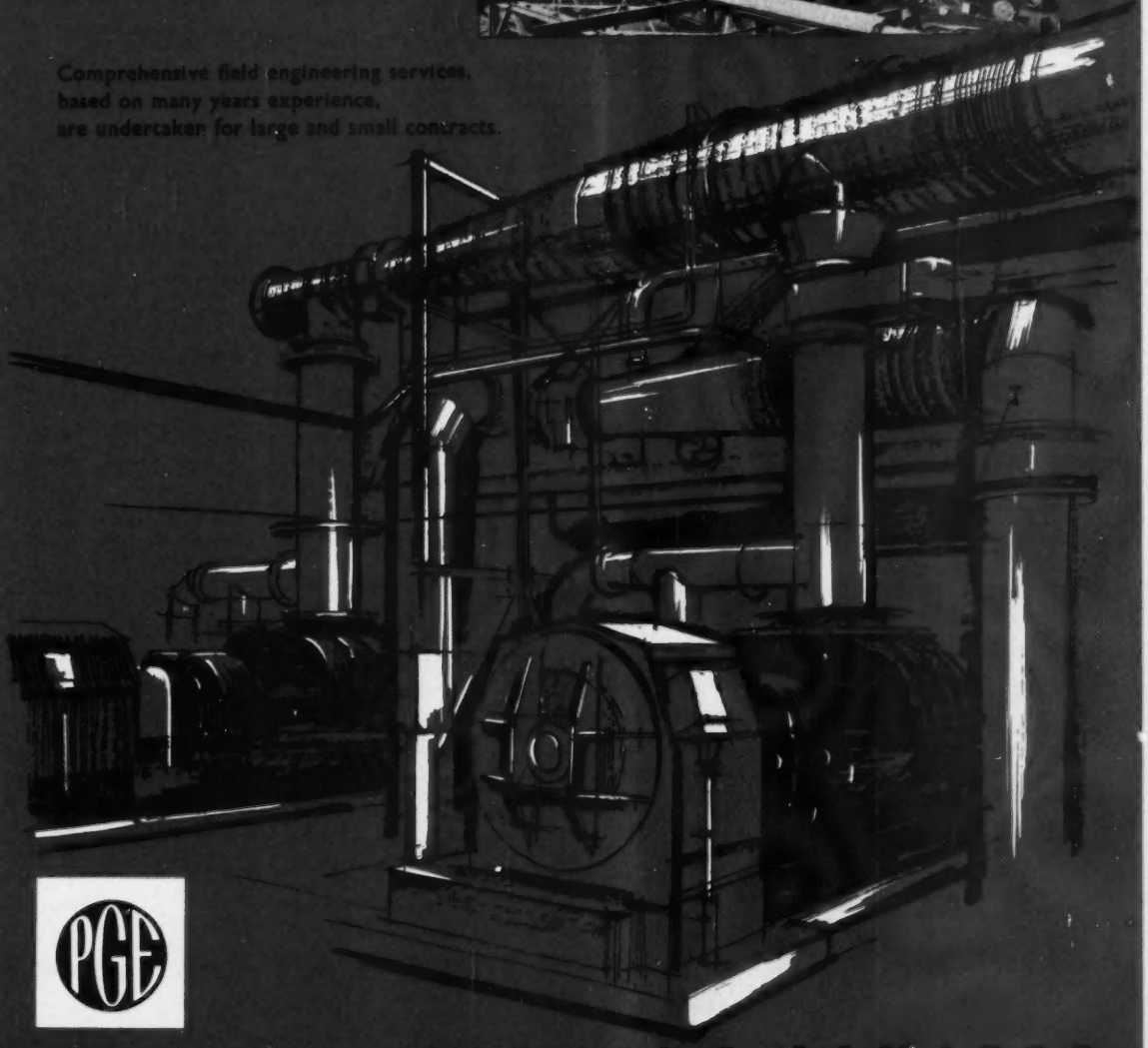

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where R denotes the coco fatty acid radical and x+y=15.

Average Molecular weight:	**875**
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Specific Gravity at 25°C/25°C:	**1.042**
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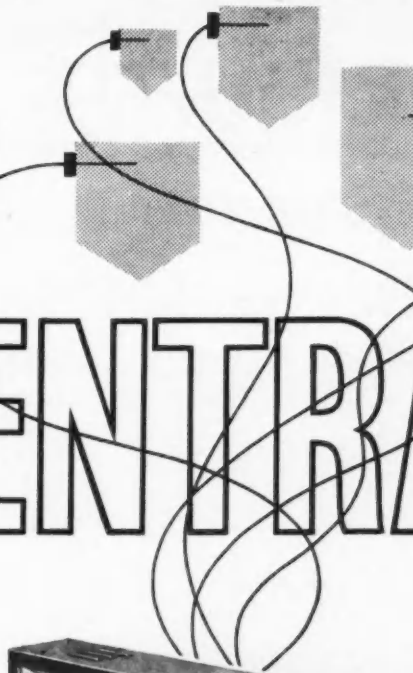

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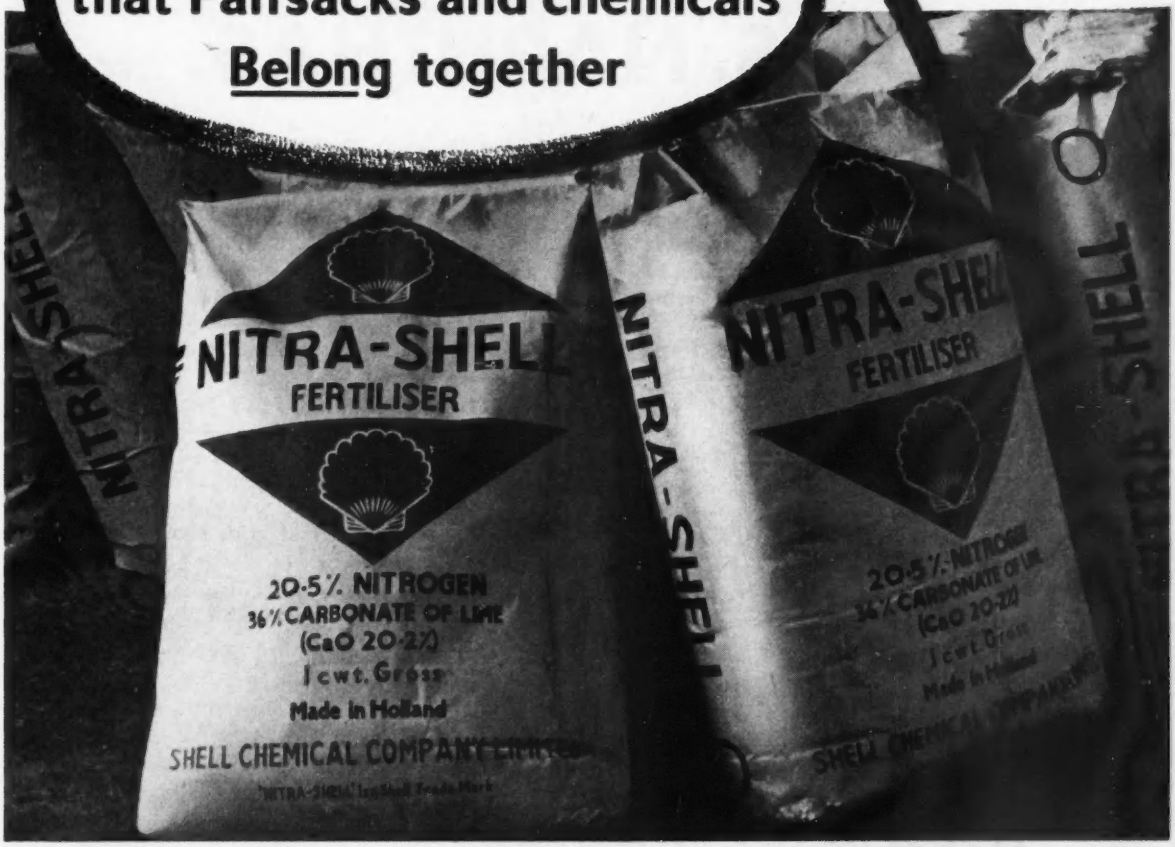

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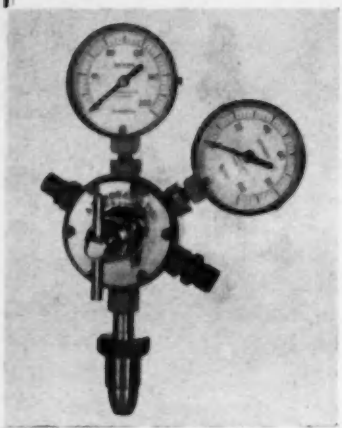

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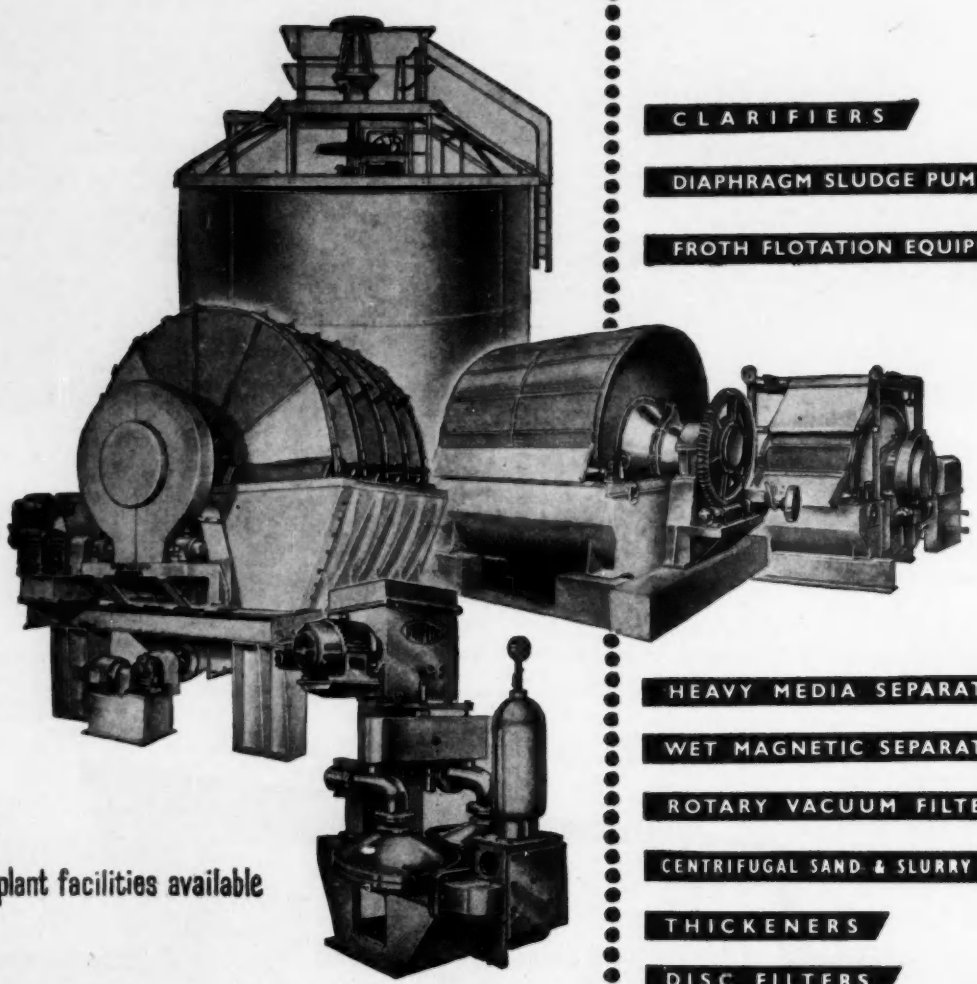

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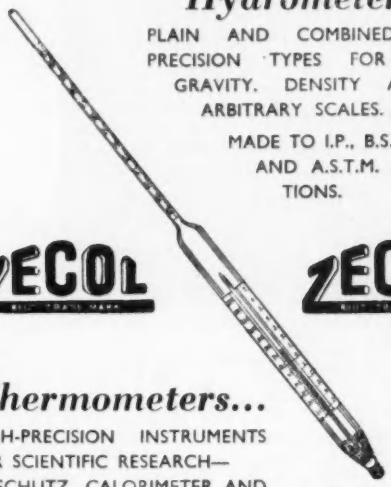

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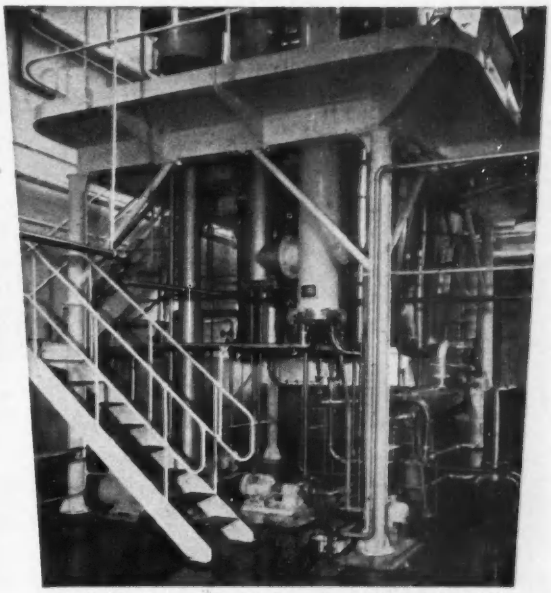

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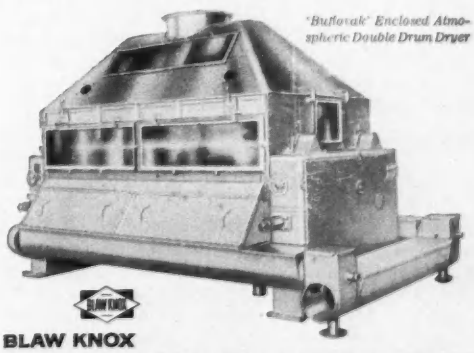

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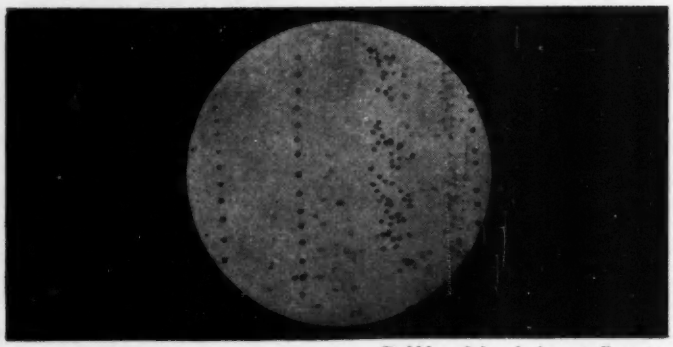

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Editor M. C. HYDE
Manager R. C. BENNETT
Director N. B. LIVINGSTONE WALLACE

Midland Office
Daimler House, Paradise Street, Birmingham. [*Midland* 0784-5

Leeds Office
Permanent House, The Headrow, Leeds 1. [*Leeds* 22601]

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116 Hope Street, Glasgow C2. [*Central* 3954-5]

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CHEMICAL AGE

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SCIENTIFIC MANPOWER

PUBLISHED this week were the eagerly awaited Advisory Council of Scientific Policy's Annual Report for 1958, and the Report of the Advisory Council on Scientific Policy's Committee on Scientific Manpower entitled 'Scientific and Engineering Manpower in Great Britain 1959.' Both are White Papers.

On the question of scientific manpower which was last surveyed in 1955, the Council notes with satisfaction that the proportion of scientists taking up employment in industry has increased as they hoped it would do and that the share taken by defence, both in industry and Government departments, has fallen.

The annual supply of newly-qualified scientists and engineers and the rate of growth in their employment, has exceeded the expectations of 1956, it is noted but the Council sees no indications that the universities and colleges of advanced technology are training in total more qualified scientists than will be needed. It is evident from the report, however, that there are problems and employment difficulties among particular groups, and notably in the field of biology. The Council advise that those interested in biology should obtain supporting qualifications either in mathematics or in one of the physical sciences. It is stressed that there is little chance of the average biology graduate obtaining employment in industry or Government departments and even openings in the teaching professions are foreseen as being less numerous in the future.

Space research was mentioned by the Minister of Science, Lord Hailsham, in a statement shortly after his appointment. British instruments will be included in satellites launched by the U.S. over the next three to four years and a steering group under Sir Edward Bullard will co-ordinate the U.K. space research programme as a whole. Because of the costliness of space research, the Council rightly advise that the U.K.'s contribution should be part of an internationally-based approach.

In the Council's last report the various channels through which funds were provided for university research in this country were discussed. These included the universities' general income mainly from Treasury recurrent grants; research councils and the Royal Society, and other bodies such as Government departments, charitable foundations, and industry. It has been evident however, that increasing support for research projects in British universities and other research institutions has been coming in recent years from foreign organisations, principally from Government agencies and charitable foundations in the U.S. As a result of information supplied by U.S. authorities, it is estimated that financial support for research in this country from Government agencies and charitable foundations in the U.S. amounts to something of the order of £1¼ million a year, made up as follows: U.S. Service departments and agencies nearly £¾ million a year; U.S. civilian agencies, including the National Science Foundation, National Institutes of Health and the Department of Agriculture, about £¼ million a year; and charitable foundations (e.g. Rockefeller, Ford, Kellogg Foundations), about £½ million a year. Money from these last is usually given in the form of grants, but most of the money from U.S. Government agencies has so far been in the form of contracts for specific research projects.

The present report on scientific manpower contains the results of the enquiry by the Ministry of Labour into employment of qualified scientists and engineers in 1959 and employers' forecasts of requirements by 1962.

In January of this year, it is learned, there were about 173,000 scientists and engineers in all fields of employment, including 72,200 scientists and 100,800 engineers. This estimate shows an increase of nearly one-fifth (28,000) in the numbers employed early in 1956. In addition there were over 43,000 holders of Higher National Diplomas and Certificates this year.

The survey shows that of an increase of 23,000 in the number of scientists and engineers, 63% went to private manufacturing industry, 13% to the nationalised industries, 5% to central and local government and 17% to education. An analysis of scientists and engineers by subject of qualification reveals that this year there were 63,200 scientists and 89,200 engineers. Forecasts of requirements by 1962 call for an increase of 20.6% in the scientists and 22.7% in the engineers on these 1959 figures.

In 1956 industry reported that it aimed to employ 37% more qualified scientists and engineers in the following three years. The report shows, while industrial production during the period was relatively stable, the number of scientists and engineers in manufacturing industry increased by 30%. In the chemical and allied trades industry, for instance, recruitment of scientists and engineers substantially exceeded the industry's forecast.

Of the qualified scientists and engineers employed in manufacturing industry 41% were found to be engaged on research and development compared with 44.5% in 1956. It is estimated, also, that about one-quarter of all scientists and engineers engaged on research and development in industry and in Government research establishments were employed on defence compared with two-fifths in 1956.

Among the nationalised industries the Atomic Energy Authority has shown the largest increase in the number of scientists and engineers during the period 1956-59 (71%). The Authority, it is learned, looks for a further increase of 42% on the 1959 figures by 1962. The Electricity Authority hope to recruit 35% and the British Transport Commission 29% more scientists and engineers in the next three years. Government departments have made a smaller claim on scientific manpower than expected, the increase being only 7½% compared with a forecast of 14%. This has been mainly due to the number employed in defence departments remaining unchanged. Forecasts for 1962 show a 2% reduction on the 1959 figures for defence but increases of 12% for civil departments and 16% for research councils.

The forecast for 1962 is that 211,700 scientists and engineers will be needed to meet employers' forecasts of requirements, an increase of 38,700 on the 1959 figures. Another 14,400 will be required to compensate for wastage, thus making a total of 53,100. With regard to how far these requirements will be met on the basis of information available, the number of scientists and engineers who will become qualified in the next three years (1959-1961) in Great Britain will be about 51,650, of whom about 60% will be university graduates or holders of the Diploma of Technology or associates of one or other of the higher educational institutions. The numbers estimated for employment, however, are 47,500 or 5,000 less than the estimated requirements. Shortage of chemists, physicists and mathematicians is likely to continue.

POLYPROPYLENE PATENT POSITION

THAT the polypropylene position is a tricky one has been obvious ever since announcements were made by Montecatini earlier this year. Now it appears that the U.S. Patent Office is in difficulties in separating overlapping claims in polypropylene from over 20 different interests (*Chemical Week*, 1959, **85**, No. 19, 22).

During the latter half of 1958 some 278 patents had been published, in countries such as Australia, Belgium, West Germany, India, South Africa, 209 of these dealing with processes, catalysts and engineering and 69 dealing with application research.

Phillips Petroleum's Australian Patent No. 26,004/57, in which claims are made of a normally solid crystalline polymer of an olefin having at least carbon atoms per molecule, is considered a significant one. Phillips have a total of 69 patents overseas with important ones dealing with the use of their chrome oxide catalyst. In the main, however, the great number of their patents are concerned with engineering considerations, solvent recovery, transfer of materials, activation of catalyst, and monomer removal, etc.

Next in line is Montecatini with a total of 36—19 patents concerned with processes, catalysts and engineering and 17 with application research. The importance of the Montecatini patents lies in the fact that they deal with fundamentals of the process, such as the type of catalyst suitable, and the large number on applications. Montecatini jointly with Ziegler also hold 16 process, catalyst and engineering patents.

A surprising point is the finding that Hercules Powder, first polypropylene producer in the U.S., only have five patents, but the explanation here seems to lie partly in the company's attitude towards patenting and partly in the fact that its interests are centred mainly in the U.S.

In 1958, it will be recalled E.I. Du Pont de Nemours and Co. obtained a composition of matter patent on linear polythene (see CHEMICAL AGE, 11 January 1958, p. 86) which threatens all polythene producers in the U.S. The position is now further complicated by the charge by Ethyl Corporation that Texas Alkyls and their owners Hercules Powder and Stauffer Chemical have been infringing Ethyl's patented process for making aluminium alkyls. And according to reports from the U.S. legal cases are developing in regard to polypropylene.

In the U.S. the following companies, according to patent applications, have carried out research on polypropylene: Phillips Petroleum, Union Carbide (11 patents on processes, catalysts and engineering and one on application research), Esso Research and Engineering (five), Goodrich-Gulf Chemicals (five), Hercules Powder (five), W. Burke (four), Du Pont (three and one on application research), Western Electric (four on application research), Dow Chemical (three on application research), Standard Oil Ind. (three on processes, etc.) and other U.S. companies—Koppers, Cabot, Westinghouse, General Tire and Rubber, and Diamond Alkali.

Companies in Europe known to have patents, besides Montecatini and Montecatini and Ziegler jointly, are as follows. *West Germany*—Farbwerke Hoechst (10 and 6), Ruhrchemie AG (16), Badische Anilin- and Soda Fabrik (12), Bayer AG, Gelsenberg Benzin, Verein Glanzstoff, Karl Ziegler (7), Chemische Kerke Hüls (4 on applications research), Hibernia AG (2) and Titangesellschaft: *France*—Rhone-Poûlenc (6), Solvay and Cie (5), Rhodiaceta, Centre National de Reserche; *Netherlands*—Bataafsche (Royal Dutch) (3); *Belgium*—Union Chimique Belge (4), Belge du Titane (2), Solvic SA (2).

In Britain Imperial Chemical Industries Ltd. have 10 patents involving processes, catalysts and engineering and six on application research, Petrochemicals Ltd. have two patents lodged in Belgium, the British Rubber Producers' Research Association have two patents on application research in India and Bakelite Ltd., one patented in South Africa.

Contract News

Monsanto to Build Forth Chemicals' Styrene Expansion

● AN expansion of monomeric styrene facilities which will raise capacity to about 50,000 tons per year in 12 months time, has been approved by Forth Chemicals Ltd., whose plants are at Grangemouth, Stirlingshire. Forth Chemicals are owned two-thirds by British Hydrocarbon Chemicals Ltd. (a joint subsidiary of British Petroleum and the Distillers Company) and one-third by Monsanto Chemicals Ltd.

The new styrene expansion has been designed by Monsanto's own engineering department who will carry out construction and commissioning.

● COMPLETE plant for the production of polystyrene, with a rated capacity of 5,000 tons a year, is to be supplied by P. G. Engineering Ltd. Stockton-on-Tees, a member of the Power-Gas Group, under contract with V/O Techmashimport, Moscow. Value of the complete plant supply is about £650,000 and delivery is scheduled to start in 1960. The process design is to be supplied by BX Plastics Ltd., Manningtree, Essex, who have recently installed a new unit of this type. Engineering and supply of equipment for the complete plant will be by P.G. Engineering. Both companies will send engineers to Russia during the erection and commissioning stages of the plant.

● NEW synthetic rubber project in Australia has Fluor Inc. as main contractors.

● CONTRACT signed in Moscow on St. Andrew's Day with John Dalglish and Sons Ltd., Thornliebank, Glasgow, is for the manufacture, supply and erection of a series of equipment for dewatering, drying, baling, wrapping and packaging of synthetic rubber. The plant will have an annual output of 70,000 tons and the contract is worth more than £500,000. Located in Siberia, the plant's four three-tier drying machines will be made in Glasgow. John Dalglish as main contractors, will be responsible for the supply and co-ordination of the other equipment.

● WILLIAM BOBY AND CO., Rickmansworth, Herts, have been awarded a contract by Courtaulds for a complete and fully automatic demineralisation plant for a new Russian synthetic fibre factory.

Finland Requests Enriched Uranium from IAEA

First formal request from the Finnish Government for enriched uranium is reported to have been received by the International Atomic Energy Agency.

Request for the special fissionable materials, says the report, relates to the planned Triga Mark II reactor due for completion in 1960, and to a critical assembly. Fuel requested for the latter is 10% enriched, and the amount of U-235 should be 3.0 kg.

S. P. Chambers Forecasts More I.C.I. Trade with Soviet-bloc

AT the Heavy Organic Chemical Division's dinner at Billingham recently, Mr. S. P. Chambers, chairman-designate of Imperial Chemical Industries Ltd., reported that the company was doing well and that 1959 was proving to be a good year. He warned, however, that competition was now so keen that the company was having to "fight hard" to sell its products. This increased competition and the changing pattern of trade resulting from the formation of the European Customs Union and the 'Outer Seven' Free Trade Association meant that I.C.I. was having to seek new markets.

Mr. Chambers indicates that these markets would be increasingly in the 'Iron Curtain' countries.—I.C.I. could look to more markets in the 'Iron Curtain' countries, he commented. It was not only a question of selling products but of selling 'know-how', and Mr. Chambers hoped there would be a two-way flow of trade in the future. . . . "You might say that so far as trade with Iron Curtain countries is concerned, there is going to be a new era, and much of the business we may lose in some countries we may gain in others".

Looking to the future, Mr. Chambers said that there were some things which needed attention. They were not bad in themselves, but they were weaknesses which needed seeing to at a time when the company was having to fight hard to sell its products. "Any idea that we can sit back and that our products will sell themselves is utterly wrong". In Holland, for instance, in a few years, German chemicals would be able to enter what had been traditionally an I.C.I. market without any tariff barriers whatever—but I.C.I. products would face a much higher tariff than at present.

There would be advantages as well as disadvantages arising from the formation of the Outer Seven—an example was that in a few years Swiss chemicals would be entering Britain free of tariffs. This all meant, however, that I.C.I. had to sell all they could to other markets.

Mr. Chambers reported that he had had meetings with Russian and Polish trade visitors recently and that he hoped to visit Poland in February. Already a Polish and Russian delegation have visited Billingham and Wilton with a view to future trade and recently, Mr. Chambers states, he had made a visit to Rumania.

I.C.I. Profits Now More Satisfactory, Reports Fleck in Last Council Speech

COMMENTING on the financial results of Imperial Chemical Industries, chairman Sir Alexander Fleck, in his farewell speech to I.C.I.'s Central Council, stated though profits for the half-year ended 30 June 1959 were up by half as much again as for the first six months of 1958, it had to be remembered that these results were being compared with what was a disappointing result in the first half of last year. If the very large capital invested in recent years in I.C.I. was taken into account, however, the profits were now somewhat more satisfactory than in 1958.

Exports had exceeded £40 million in this first half-year. This was a substantial increase over any half-year figure so far achieved. It was particularly satisfactory, Sir Alexander noted, that sales to Europe, excluding Soviet Russia, had significantly increased while sales to the U.S.S.R., mainly plastics, had reached record levels.

Closure of a number of Nobel Division plants and the closing down of the original Terylene spinning plant at Hillhouse were referred to by Sir Alexander as well as the "positive developments" which have taken place within I.C.I. in recent months. "Perhaps the most important is our decision to enter into an agreement with the Aluminium Company of America—Alcoa". The joint company which has been formed—Imperial Aluminium Co., or Impalco, has a capital of about £10 million and forms part of I.C.I.'s works council system. The partnership, according to the I.C.I. chairman "is the best way of continuing the expansion of an industry which has had sensational growth over the years and has not yet reached its peak".

Reference was made to the formation with Stewarts and Lloyds Ltd., of a jointly-owned company to manufacture special steel tubes and to the erection of a new plant near Dumfries for the manufacture by Plastics Division of Melinex. This plant is on the site of the former Ardil factory and quite a number of employees from the latter are already employed in the early stages of the new Melinex plant.

Of activities of I.C.I.'s associate company in South Africa, African Explosives and Chemical Industries Ltd., Sir Alexander said he "personally remained convinced of the long-term value—and it is far more than just financial value—of maintaining and indeed increasing our investment there".

Symposium on Organic Phosphorus Compounds

The Bradford Institute of Technology will conduct a symposium on organic phosphorus compounds on 29 January, comprising four lectures. Application forms and other details are available from the registrar.

★ SECRECY appears to shroud the visit to London of Mr. G. R. Kostanov, the second deputy chairman of the Soviet State Committee for the Chemical Industry, and his negotiating team. They are here apparently to buy large quantities of chemical equipment and according to reports from Moscow are satisfied with the fact that they are purchasing on favourable credit terms.

It is reported that present purchases from the West could be doubled or trebled if suitable credit terms were made available. This is borne out by the current issue of the Bulletin of the European Economic Community which states that Soviet output of chemical equipment in the first six months of this year was only 28% of that planned for the whole year. Large orders placed with the U.K., France and Italy are not thought likely to be sufficient to prevent delays in the investment programme.

Soviet imports of chemical equipment were nearly £18 million in 1958 and orders placed in the U.K. this year are said to have exceeded that figure. Not only is the U.S.S.R. seen as a vast and expanding market for U.K. chemical plant, but Mr. S. P. Chambers, who succeeds Sir Alexander Fleck as I.C.I. chairman, next March, believes that the Soviet bloc also represents a good potential market for British chemicals (see p. 851).

★ THE 'polythene-polyethylene' saga continues with I.C.I., the discoverers, still very much in favour of the word they coined, 'polythene,' and the other U.K. manufacturers—British Resin Products (distributors for British Hydrocarbon Chemicals), Monsanto, Shell and Union Carbide all using 'polyethylene.'

Now the British Plastics Federation has announced that it considers the two terms to be equivalent, and has recommended to the British Standards Institution that both should be shown as of equal status. For the sake of administrative convenience, however, the federation will continue to use the word 'polythene' with a footnote to the effect that 'polyethylene' is equivalent. The B.S.I. has been asked to use the term 'polythene' in all future standards, but that on the first occasion of its use in a B.S. or similar document, a footnote should indicate that 'polyethylene' is an equivalent term.

This does not seem to advance the controversy very much, except to add further confusion; presumably the 'formula' will satisfy the 'polyethylene' protagonists for the time being. At any rate, I am sure that the British housewife, aided by the national press, will continue to look on this polymeric substance, which has been the subject of so much wordy argument, as 'polythene.'

★ TO OFFSET a decline in profitability in the Canadian chemical industry, there is a need for higher tariffs, increased exports and a more realistic attitude towards new investment. This is the view of Mr. Peter Allen, president of Canadian Industries Ltd., given at a recent New York meeting of the Manufacturing Chemists' Association. Although output has increased at an average annual rate of about 7%, compared with 4% for the Canadian economy as a whole, the average rate of return on gross operating investment in the chemical industry is now only half that for the immediate post-war period. While investment has more than doubled in the last eight years, total profits are stationary.

The post-war drive in Canada has gone some way towards diversification and has created an industry which to-day makes 85% of the 100 leading U.S. chemical products in terms of value. Substantial overcapacity has been built into the industry in a belief in Canada's unlimited future. Sections of the industry facing the most acute problems are those exposed to the full force of import competition, particularly synthetic organic chemicals and plastics.

Mr. Allen believes that Canadian manufacturers could export much more to the U.S. for the tariffs there on chemicals are not 'always impossibly high.' They should not, however, allow themselves to be blinded by the country's brilliant prospects or they will be making "some very dubious investments".

★ BEHIND the news that the Association des Planteurs de Pyrethre du Congo Belge et du Ruanda Urundi (A.P.L.Y.) are to build a new pyrethrum extract factory at Goma lies the fact that production of this growers' organisation now warrants new and efficient plant devoted to the extraction of their crop.

Head of A.P.L.Y., Mr. Leon Hamburger, recently signed a new agreement in London with Mitchell Cotts and Co. Ltd., who are exclusive agents for A.P.L.Y. extract. So far, the flowers produced by this co-operative have been extracted on a contract basis which has proved uneconomic.

E. African pyrethrum should earn $5.6 m. in the year ending June next. This is the value of the insecticidal liquid extract and powder obtained from pyrethrum flowers which the U.S. is expected to import during that period. The pyrethrum flower crop in Kenya is expected to amount to 6,500 tons (an increase of 2,450 tons) with an estimated export value of the extract of £2.5 million, of which exports to the U.S. will account for about £2 million.

According to the present trend of orders, the Kenya Pyrethrum Board estimates that it could have sold overseas some 12% more than the estimated 1959-60 crop. To meet increasing overseas demand from insecticide manufacturers, the board foresees a production in the ensuing year, of 8,000 tons of pyrethrum flower with an export value, mainly in the form of extract, of over £3 million.

★ I HAVE written before of the growing interest shown in Europe by U.S. chemical market researchers. Two recent developments that confirm this fact are the special service established by the Robert S. First Inc. (see 'Overseas News', p. 859) and the acquisition of the established and well-known London consulting business of George Lewi and Partners by the Roger Williams organisation of Princeton, New Jersey (see p. 853).

Of the two, the latter is the more significant development, for it provides the first European office of a U.S. chemical market research company. The U.S. firm is probably the largest in the world devoted entirely to chemical market research; while Arthur D. Little probably have a bigger turnover in this field, they also have a vast interest in contract research.

This setting up of a European office is of great interest in view of the rapid and continuing post-war expansion of the British and Continental chemical industries and the mounting U.S. investment in European chemicals. While market research in Europe, both by companies and consultants, has not developed to the extent that it has across the Atlantic, it will undoubtedly grow in importance in the next few years. As European companies increasingly establish market research divisions they will find greater use for independent consultants. The independent firm can offer the anonymity that most chemical companies cherish when evaluating the potential market for a new product.

★ FOLLOWING our summary of the National Chemical Laboratory's annual report, in which it was stated that cellulose derivatives show interesting ion-exchange properties (C.A., 14 November, p. 687), I now learn that a certain amount of this work was done in conjunction with W. and R. Balston Ltd.

This company is now offering through their sole selling agents, H. Reeve Angel and Co. Ltd., a complete range of Whatman cellulose ion-exchangers available in the form of paper, powder or floc. In addition to the cellulose phosphate, the Whatman range also includes carboxylated celluloses, aminoethyl, diethylaminoethyl and Ecteola celluloses.

If any of my readers are interested in the unusual properties of these cellulose based ion-exchangers, the company have available a new descriptive leaflet.

Alembic

Chemical Market Research

U.S. FIRM OPENS EUROPEAN OFFICE FOLLOWING ACQUISITION OF GEORGE LEWI AND PARTNERS

ACQUISITION with effect from 1 December of the established consulting practice of George Lewi and Partners by Roger Williams Technical and Economic Services Inc., of Princeton, New Jersey, marks the first step into Europe by a U.S. chemical market research organisation. The present staff of George Lewi is being maintained and Mr. Terence D. O'Keeffe, senior partner, has been appointed vice-president and director of the Princeton company and European manager.

Established 10 years ago in November 1949, Roger Williams Technical and Economic Services also have an office in New York. The company has served more than one-third of the 100 largest U.S. manufacturing companies, including all the major chemical organisations. It has operated throughout the American Continent, Europe and the Far East, serving both U.S. and foreign companies, including several British chemical firms.

George Lewi and Partners are already serving clients in the U.K., the U.S. and West Germany. Title of the company has been changed to that of the Princeton parent organisation and, with its office retained at Hanover Court, Hanover Square, London W.1, it becomes the European office of Roger Williams Technical and Economic Services, covering the U.K. and the Continent, including the Common Market countries and members of the Outer Seven.

Further Expansion

Additional staff are to be taken on immediately for the European office and it is planned to extend European operations with an office on the Continent in the "not-too-distant-future", Mr. Roger Williams Jr., president, told CHEMICAL AGE in London last week. He added that acquisition of George Lewi would lead to greatly extended chemical market research activities in Europe. Mr. Williams believes that the new development "will catalyse European interest in market and economic studies."

The company will now be able to offer a comprehensive service in its specialist field, covering studies in Europe for U.S. companies, studies in the U.S. for British and Continental chemical companies, in addition to market research and economic studies in Europe for European companies.

At present, Mr. Williams feels that chemical market research, both by professional independent consultants and the chemical companies themselves, "is at the same stage of development as it was in the U.S. 10 years ago and that similarly, it is now at the point of large-scale expansion. The development of the Common Market and the Outer Seven has reinforced the interest of European companies and U.S. corporations in market evaluation and economic studies of this kind. The large U.S. investments in Europe—a development which is continuing—as well as continued expansion of individual European chemical industries will call for chemical market research on an ever-widening scale."

T. D. O'Keeffe, left, with Roger Williams in the American Club, London, following acquisition of Mr. O'Keeffe's consulting practice

Europe's imports from the U.S. of plastics materials, amounting to $87 million a year are seen by Mr. Williams as one reason why this sector of the European chemical industry will continue to expand. "Intelligent and accurate market evaluation will ensure," he says, "that European countries will in due course erect their own plants with capacities sufficient to meet these imports and to cover any expected increases in demand."

After studying mathematics and physics at Amherst University, Mr. Williams joined E.I. Du Pont de Nemours, specialising in the economics of operations on the company's ammonia plants. He was given leave of absence to study organic chemistry, chemical engineering and business administration at the Massachusetts Institute of Technology, returning to Du Pont's Plastics Division, where he continued his work in production costing, plant economics and market research studies. He left Du Pont's after the war to become associate editor of the McGraw Hill publication *Chemical Engineering*, which he left to develop his own chemical market research organisation which had been set up in 1949.

Mr. O'Keeffe's academic background is an M.A. from Cambridge University in Natural Sciences. Research experience includes three years in radar for the Government. He spent four years post-war in Germany on behalf of the Research Branch of the British Control Commission establishing the German Bureau of Standards in Brunswick, recruiting all scientific personnel and directing research activities and policy. This was followed by three years with the Foreign Office as advisor in physics and physical chemistry to the Allied High Commission. Mr. O'Keeffe developed an interest in chemical industry and joined George Lewi and Partners seven years ago. He is now principal of the firm. He is a member of a number of learned societies in three countries and holder of several honorary appointments, such as British representative of DECHEMA. His main fields of interest are: plastics technology, anti-corrosion, pesticides, acids and fertilisers.

One-coat Acrylic Resin Enamel Developed

THE firm of Lewis Berger (G.B.) Ltd., Freshwater Road, Dagenham, Essex, are handling a new product 'Bergercon,' a one-coat stove enamel claimed to be harder and yet more flexible than any other enamel available.

Berger's are in fact sub-licensees of Styrene Co-Polymers Ltd., which is owned by three equal partners, Shell Chemical Co. Ltd., Pinchin Johnson and Associates Ltd., and Lewis Berger.

The product Bergercon, an acrylic-resin based material, is said to have been tested under a variety of arduous conditions, including exposure for 1,000 hours at 95-100° F. and approximately 100% relative humidity; immersion in water for 4,000 hours at 100° F.; immersion in a 2½% detergent solution at 160°F. for 48 hours, and in boiling detergent solution for 30 minutes.

Will

Professor Sir Ian Morris Heilbron, D.S.O., F.R.S., member of the Advisory Council on Scientific Research and Technical Development, Ministry of Supply, and formerly Professor of Organic Chemistry and Director of Organic Chemical Laboratories, Imperial College of Science and Technology, who died on 14 September last, aged 72 years, left £18,092 net (duty paid £2,722).

Letters to the Editor

R.I.C. Relations with Consulting Scientists' Association

SIR,—In your issue of 28 November you give an account of a recent meeting of the Association of Consulting Scientists in which it is stated (p. 770) ". . . there was some criticism of the ethical approach of the Royal Institute of Chemistry to the question of advertising on the part of consultants". This account is quite accurate but I should like to emphasise that this was an open meeting attended by both members and non-members of the Association, and that this Association has not yet adopted any official policy on this controversial question.

To avoid some misconceptions which appear to have gained belief in some quarters I should also like to make it clear that we have received the most helpful consideration and co-operation from the Royal Institute of Chemistry from the inception of this new Association. A joint consultative committee was formed at an early stage in our history and meets regularly. This Association is *not* a split away from the Institute and does not propose to become a trade union or dictate in any way to its members as to how they should run their practices. Its prime object is to help firms get in touch with the most suitable consultant for any particular purpose. The Association differs from the Institute in that it includes not only chemists and chemical engineers but also physicists, metallurgists, biologists, geologists, entomologists, microbiologists, agriculturalists, economists, statisticians and other specialised scientists. Membership is restricted to those of British nationality who hold a science degree or equivalent qualification and who have been in consultant practice for at least three years. The Association is steadily growing and an entrance fee will be required of new members after the end of this year. Business men requiring the services of a scientific consultant can usually be put in touch with a suitable person in a matter of minutes by communicating with our honorary secretary, Mr. W. H. Stevens, Park House, Hawthorne Road, Bromley, Kent. Tel. Imperial 3971.

Yours faithfully,

J. G. DAVIS,
Chairman.

Association of Consulting Scientists,
9 Gerrard Street,
London W.1.

Author on 'Propellant' or 'Propellent'

SIR,—A review of my book *Solid Propellent and Exothermic Compositions* appeared in CHEMICAL AGE for 14 November 1959. In this review some comments were made about lack of consistency in units and the spelling of propellant. I have dealt with similar comments elsewhere, but I think it would be useful to re-iterate my explanation.

In such a work as this, there is great difficulty in selecting uniform units. I decided, therefore, to retain those units normally employed in the subject matter dealt with in any section. The units used in rocketry, for example, and in ballistics are normally different from those used in theoretical chemistry. In so far as the data has been derived from work in my own organisation, I have tried to have uniformity, and this has involved many weeks of work for Miss J. M. Davidson and others who have carried out the calculations. In a number of cases, however, where the data are derived from literature references, I have thought it appropriate to quote them as they are, since I considered it unwise to have them recalculated—perhaps with insufficient understanding on my part—and thereby to assume a responsibility for accuracy which is not under control. It is always difficult to decide on what to do in such circumstances where the subject matter is very mixed, but certainly in the vast majority of cases the choice was deliberate and not due to lack of consideration.

With regard to the comments on the spelling of 'propellant', for some years now it has been standard in the explosives industry to use 'propellant' as a noun and 'propellent' as an adjective. When this is realised, I think it will be seen that the variations referred to are natural and understandable. For example, the reviewer has actually mis-spelt the title of the book. In the title 'propellent' was used as an adjective following very careful discussion with the Editor. I agree present usage is open to criticism, but I felt I had to follow it.

Yours faithfully,

JAMES TAYLOR,
Director.

Imperial Chemical Industries,
Imperial Chemical House,
London S.W.1.

Progress on Applied Research Projects Surveyed by O.E.E.C.

PROGRESS in a number of important co-operation research projects was discussed at the Fifth Session of the O.E.E.C. Committee for Applied Research held in Paris under the chairmanship of Dr. J. G. Malloch, chief scientific liaison officer, the National Research Council of Canada. In the field of research organisation and administration an enquiry on the research resources and scientific policies of member countries will go on; further information will be gathered about existing joint groups of parliamentarians and scientists, in order to create a climate of co-operation between parliament and science; an investigation is under way on fiscal measures, influencing investment in industrial research.

The possibilities of studies on fundamental research in this field as well as of including problems of corrosion of ships' hulls were also discussed. The U.S. participates in the tests and representatives of Sweden and Yugoslavia attended a meeting of this group of experts for the first time; the participation of Yugoslavia will enable better knowledge of the fouling capacities of the Mediterranean waters to be obtained.

Fire research problems were discussed at a recent meeting of an expert group. A directory of research facilities programmes and publications in over 40 European fire laboratories has been published and studies in two specific fields will be undertaken: study of unstable chemicals for plastics, and a study of fire-fighting techniques and materials by means of models. Nine O.E.E.C. countries participate in the work of this group.

An international meeting on the industrial utilisation of oil shale fines exchanged information on research and production methods in this field. The possibilities of co-operative efforts were considered and it was decided to hold another meeting later.

Big Plans for I.C.I. Billingham Under Consideration Says Dr. A. M. McKay

ACCORDING to Dr. A. M. McKay, division engineering director, I.C.I. Billingham Division, it is no secret that the division has quite a number of big plans for the future under active consideration. The division has not yet reached its peak, he comments, and it is likely to go on expanding and to retain its vigour and activity.

The past year has not been as easy as previous years because of keener indication, Dr. McKay reports. Prices for the division's products have become sharper and profit margins are lower.

At Heysham, Billingham Division's new methanol plant is stated to be in the final stages of construction and will be completed on schedule by the end of the year. Dr. McKay reports that the plant will enable the division to satisfy the very rapidly increasing requirements of U.K. customers for methanol.

New Chemical Works For Newton Chambers

A CHEMICAL works and central laboratory block to cost more than £300,000 are to be erected for Newton Chambers Chemicals Division at Thorncliffe, Sheffield.

The present Norfolk works and chemical factory at Thorncliffe are to be progressively replaced by a production unit incorporating modern plant and mechanical handling; and the new works will carry out bulk filling of disinfectants, washing creams, insecticides, detergents, cutting oils, etc.

The Izal factory is also being expanded and automatic plant is being introduced.

P.V.C.-coated Terylene for N.C.B.'s Ventilation Ducting

A new use for Terylene has been found by the National Coal Board. Previously they have used p.v.c.-coated jute, rayon and cotton fabrics for ventilation ducting—now an order for more than 30 miles of p.v.c.-coated Terylene ducting that is fire-resistant in accordance with N.C.B. requirements has been placed. It varies in diameter from 12 in. to 24 in. and has been stitched throughout with Terylene thread. Made up from a 2½ oz. per sq. yd. twistless Terylene base fabric, the ducting is about three times lighter than that formerly used.

Obituary

Mr. Leslie George Cottrall, who was widely known in the paper industry for his investigations of papermaking properties of cellulose fibres and as an authority of papermaking technology, died in hospital on 4 December. He was 67.

A Fellow of the Royal Institute of Chemistry, Mr. Cottrall was the first graduate chemist to be employed by Horton Kirby Paper Mill, then owned by Albert E. Reed and Co. Ltd. In 1923 he transferred to Aylesford as chief chemist of Reed's, and during the next 23 years was largely responsible for the expansion of the technical division, of which he was made chief in 1946.

Mr. A. D. Marks, of Ernest Benn Ltd., book publishing associate company of Benn Brothers Ltd., proprietors of CHEMICAL AGE, has died at the age of 82. He visited his office in Bouverie House each week, until last July when he finally retired after 67 years in publishing. Mr. Marks joined T. Fisher Unwin Ltd. in 1892 and was managing director when the company was taken over by Ernest Benn in 1926. Some years later he founded his own publishing company, the Quality Press, which he ran for about 17 years, returning to Ernest Benn to become sales manager in 1951.

Mr. Gomer Thomas, who was plant manager at Monsanto Chemicals Ltd., Newport, Mon, died at Swansea hospital on Sunday, 29 November. Mr. Thomas had previously been works manager at the firm's Bridgend works.

'Outer Seven' Will Mean More Competition in Home Market

POSSIBLE effects on Imperial Chemical Industries of the economic division of Western Europe into the European common market of the 'Inner Six' countries and the Free Trade Association of the 'Outer Seven' which includes Britain, were outlined by I.C.I.'s economic planning director, Mr. J. L. S. Steel, to I.C.I.'s central council. Mr. Steel states that present economic arrangements in the two groups would mean some advantage to I.C.I., but would also result in a substantial increase in competition in the company's home markets.

Though not dangerous, the prospect is not particularly attractive. Mr. Steel considers a much better and more sensible solution would be an arrangement between the Outer Seven—Britain, Norway, Sweden, Denmark, Austria, Switzerland and Portugal—and the Inner Six—Germany, France, Italy, Belgium, Luxembourg and the Netherlands. He feels that when the Inner Six have resolved some of their immediate political problems they would be more ready to make a reasonably satisfactory arrangement with the Outer Seven. Then Europe could look forward to a period of real prosperity.

Recalling the post-war position in Europe, Mr. Steel said that the Marshall Plan had enabled Europe to stave off economic collapse and allowed the countries of Western Europe to get their economies working again. This had led to the formation of the European Payments Union which had facilitated trade between the countries of Europe and had benefited exports from I.C.I. and Britain as a whole. There had then arisen a strong move for economic and political unity in the form of a Customs union, between France, Germany, Italy, and the Benelux countries, in which there would be a common tariff barrier to the rest of the world, but not to themselves.

The 15½% common tariff planned for the six countries to be in being by 1970 would mean, so far as I.C.I. was concerned, that her exports to the Common Market countries would face a tariff barrier of 15½%, compared with the present tariffs (6% on goods into the Benelux countries, 13% into Western Germany, 17% into Italy and 22% into France). The effect of a move such as this on I.C.I., who contribute no less than one-fortieth of Britain's European export, would be considerable, Mr. Steel indicated.

Paint 'Know-how' Agreement with U.S. Company

GROUP Developments Ltd. have signed a paint 'know-how' agreement with Glidden International, subsidiary of the Glidden Co., of Cleveland, U.S. one of the leading paint manufacturers. The agreement gives Group Developments Ltd. and its subsidiaries the exclusive rights to use the U.S. company's development and manufacturing technology.

Group Developments have one paint subsidiary in the U.K., Cellon Ltd., who will enjoy access to all the information available to the parent company. As an immediate result of this agreement, Cellon will acquire access to up-to-date information on technical developments, manufacturing methods and marketing techniques, in the vast paint industry of the U.S. This will be of invaluable help in the industrial metal finishes field where new materials and processes are likely to be in great demand.

New Bottle-washing Compound by Diversey

Diversey (U.K.) Ltd., whose range of industrial chemicals is now being distributed by Deosan Ltd., 42-46 Weymouth Street, London W1, announce a new bottle-washing compound, Diversey Divobrite.

Fire Damages Chemical Intermediates Plant at I.C.I. Dyestuffs Division

A fire at the Blackley, Manchester, works of the I.C.I. caused much damage but no injury to personnel. It was confined to a single building where chemical intermediates are made. Full extent of interruption to production is still not known

New Catalysts for Olefin Polymerisation Discussed at Toronto Conference

INFORMATION on new catalysts for olefin polymerisation of potential industrial interest were reported at the Ninth Canadian High Polymer Forum in Toronto recently.

Dunlop Research Centre, Toronto, reports that it has succeeded in copolymerising propylene with isoprene with a cationic catalyst, while chemists at the Ontario Research Foundation in Toronto have found an anionic system, containing aluminium triisobutyl and titanium trichloride, which catalyses polymerisation of butene-1.

Cationic Copolymerisation. Resins and rubbery polymers with molecular weights 6,000 to 10,000 are claimed for cationic copolymerisation of propylene and isoprene. If the compounds contain more than 50% isoprene, cross-linking proceeds rapidly and the products are stated to be insoluble.

Products of cationic polymerisation of propylene are reported to be distinctly different from those of the anionic Ziegler/Natta systems, the polymers being branched. The Dunlop researchers headed by Dr. Edmund H. Immergut postulate chain-transfer reactions in cationic systems, by way of explanation. These reactions involve either hydride-ion transfer or proton transfer to the monomer or to the counter ion. Both mechanisms create in the polymer an unsaturation which serves as a site for a branch or side chain.

Stabilising Comonomer

To inhibit such transfers, Dunlop introduce a stabilising comonomer on the growing end of the polymer chain. Isoprene, with a reactivity comparable to that of propylene, is a practicable comonomer. Also it gives a cation more resistant to hydride or proton transfer than the propylene cation. When butene-1 monomer is substituted for propylene, less isoprene appears in the copolymer. Butene is found to have a higher reactivity than propylene and makes up 60% of the butene/isoprene copolymer.

Polymerising Butene-1. A mixture of aluminium triisobutyl and titanium trichloride has proved a good catalyst for polymerising butene-1. For speed a combination of alkyl lithium and titanium tetrachloride has been found preferable, but the lithium catalyst has to be prepared in the presence of the monomer.

The team at the Ontario Research Foundation, Dr. Maurice H. Jones, Dr. Ursula Martins, and Melaine P. Thorne have observed that polymerisation rate with catalyst Al $(i\text{-Bu})_3/TiCl_3$ is: proportional to $TiCl_3$ concentration; independent of Al:Ti ratio (above 1:1); and independent of Al $(i\text{-Bu})_3$ concentration.

Catalyst Studies. These catalyst systems produce polybutene with molecular weights ranging from 700,000 to 1,000,000. X-ray diffraction and chemical analysis of this catalyst show that the halide complexes are mostly crystalling $TiCl_3$ with very low aluminium and alkyl content. This is stated to agree with Professor G. Natta's findings. It is also suggested that defect points on the crystal surfaces serve as active sites and on these the metal alkyl 'chemsorbs' to form complexes with the right shape for producing stereospecific polymers.

Work by Miss Thorne has indicated that 50 to 80% of Ti in the Al $(i\text{-Bu})_3/TiCl_4$ complexes appears to be tetravalent, but at ratios between 0.5 : 1 and 1 : 1, some crystalline $TiCl_3$ has been found due to reduction. Otherwise below and above these ratios, the tetrachloride is amorphous.

The trichloride form $(LiBu/TiCl_3)$ is inactive and it is suggested that it cannot initiate butene polymerisation because it forms an 'inactive' crystal structure. This crystalline complex apparently does not provide a suitable base for sites where polymerisation can take place.

Ontario Research Foundation report that detailed studies of the Al$(i\text{-Bu})_3/TiCl$ system for butene-1 polymerisation agree generally with Prof. Natta's results for propylene polymerisation using Al $Et_3/TiCl_3$ catalysts.

Quick Identification Test For Butyl

RESISTANCE to phosphate esters is a basic property of butyl rubber which is not duplicated in other general purpose elastomers or even most speciality rubbers. Immersion of butyl in tricresyl phosphate is reported to yield volume swell results of less than 10% as determined by AS7M Procedure D-47L for 70 hours at 212°F. Of the various other polymers checked by Enjay Laboratories of Esso Petroleum Co., only a silicone approached the performance of butyl rubber. Other materials yielded volume swells of 20 to greater than 700%.

Reproducibility of the immersion test results has been demonstrated and Enjay report that this test is sufficiently accurate for identifying butyl among other general purpose elastomers. The data obtained further indicate that compounding variables and cure time did not appreciably alter the swelling characteristics of butyl rubber (Technical Information Sheet No. 8 gives details).

Stiffening Agent for Butyl Rubber. Use of coumarone-indene resin (as a 10-part loading) is reported as a stiffening agent for Enjay butyl rubber. The resin is stated to cause a substantial increase in the Shore "A" hardness of a butyl compound while maintaining its other physical characteristics. This hardness can be broken on flexing or heating, but will return once again after relaxing or cooling of the test sample. Coumarone-indene resin also serves as a processing aid for extrusion compounds imparting a high green strength.

A section of hard hose (containing 10 parts of the resin) was found to completely retain its stiffness after immersion in hot water (160°F) for a period of one week. When oven-aged at 300°F for one day, the melting point of the resin was exceeded and the hose softened. After standing at room temperature, the resin reset and the hose retained its original hardness (Enjay Technical Information Sheet No. 12).

Coumarone-indene resin also serves as a processing aid for extrusion compounds imparting a high green strength and resistance to cold flow.

Processing Oils for Butyl Rubber. These rubber compounds require oils with low levels of straight-chain unsaturation Necton 60 (Penola Oil Co.), an acid-treated, mid-continent, naphthenic/paraffinic oil, is reported to meet this requirement and has been widely used in butyl tyre compounds. Naprex 916 (Socony-Mobil Oil Co.) and Coprol B (Atlantic Refining Co.) are two other oils which have been tested as possible substitutes for Necton 60 (Technical Information Sheet No. 10).

Butyl Steam Hose. Heat and moisture resistance of Enjay Butyl are claimed to make it an excellent polymer for use in steam hose. A compound composed of Enjay Butyl 325 (100 parts), Neoprene W (10), Vistanex L-100 (5), FEF Black (50), Zinc Oxide (5), Dibenzo GMF (6), PbO_2 (10), is recommended for this application, since it extrudes well with scorch safety and possesses the necessary level of physical properties and resistance to steam ageing. Ozone tests conducted on cured Garvey strips have shown no cracking after 72 hours exposure to 50 p.p.m. ozone at 100°F (Technical Information Sheet No. 11).

Butyl to Metal Adhesions. Two new vulcanisable cement systems are now available for butyl to steel adhesion. Optimum adhesion is reported to be obtained with both cement systems by treating the steel with phosphoric acid. It is believed that phosphoric acid treatment should be especially useful in low sulphur content stocks which ordinarily show relatively low adhesion values.

The procedure adopted is to sand blast the metal and then dip it in 10% by volume phosphoric acid for seven minutes. After the dip, the metal should be washed thoroughly in hot water, dried and used immediately. The rubber should be used as soon after processing as possible and if it is dusty or aged, it can be freshened with hexane just prior to use. To cement, primer is applied in a thin coat and allowed to dry for about five minutes; a cover coat is applied over the primer and allowed to dry five minutes. Ty-Ply, Bostik, Chemlock and Thixon systems are listed (Technical Information Sheet No. 9).

In Parliament

A.E.A. to Spend £37 million on Capital Work In 1959-60

The vote for the Minister for Science, totalling £36,900, represents an increase of £4,080 over the previous amount which appeared under different headings. This was stated by Sir Edmund Boyle, Financial Secretary to the Treasury, in a supply debate on Monday on the Civil Supplementary Estimate for the office of the Minister of Science.

He said that the Department of Scientific and Industrial Research spent £4.5 million in 1950-51 and that the estimate for the current year was £13.25 million. Corresponding figures for the Medical Research Council were £1.75 million in 1950-51 and £3.5 million for the current year; £2 million for the Agricultural Research Council in 1950-51 and just under £6 million for 1959-60. The Atomic Energy Authority was spending £71 million in 1956-57 and would spend £92 million this year, comprising £37 million of capital expenditure and £55 of current expenditure.

Origin Rules For 'Outer Seven' Published

RULES of origin for the 'outer seven' (European Free Trade Area) have been published as a White Paper, available from H.M. Stationery Office, Kingsway, London W.C.2, price 7s. Under the origin rules goods will benefit from the reduction and eventual elimination of tariffs if not more than 50% of the export price is accounted for by non-E.F.T.A. materials, or alternatively if the finished product has undergone certain processes within the area. Exporters can choose under which criterion the goods should qualify.

The White Paper contains a list of basic materials which when used in manufacture count as part of the finished product's area content independent of their origin.

Fire at Brotherton's Chemical Drying Plant

A CHEMICAL drying plant in the Brotherton and Co. Ltd.'s Calder Vale Road, factory, Wakefield, was damaged by a fire last week which had to be tackled by the Wakefield City Fire Brigade who wore breathing apparatus "because of the chemical fumes". The city firemen took over from the works' brigade, whose handling of the blaze was highly praised by Wakefield's chief fire officer.

A statement from the management indicated that work at the plant would be 'virtually uninterrupted', though further details were not revealed.

Frederick Allen's New Warehouse

Frederick Allen and Sons (Poplar) Ltd., chemical manufacturers, Upper North Street, London E.14, are having a large warehouse built on a site at Hatherly Wharf, Bow Common Lane, London E.3, at a cost of £30,000.

Next 40 Years will be Era of the Chemist, says S. P. Chambers

Ready to receive guests at the Ramsay chemical dinner in Glasgow last week were: left, Mr. S. P. Chambers, C.B., chairman-designate of I.C.I., and Mrs. Chambers, and, right, Mr. E. Le Q. Herbert (managing director, Shell Refining Co.), president Royal Institute of Chemistry, and Mrs. Herbert

THE second half of the twentieth century would be the era of chemistry, just as the first half of the century had been the era of a new revolution based on electric power, bringing automatic process control. This was stated by Mr. S. P. Chambers, C.B., chairman-designate of Imperial Chemical Industries Ltd., when he proposed the toast of "The Profession of Chemistry" at the Ramsay Chemical Dinner held in Glasgow on 3 December. Mr. E. le Q. Herbert, president of the Royal Institute of Chemistry, presided over an attendance of 210, an increase of about 30 over last year's dinner.

Mr. Chambers stated: "We are going to see a big development, the further development, of the chemical industries of the country; the further use of chemical processes not only in medicine, where there will be a greater turning towards chemistry than towards other methods of curing, but chemical processes and chemical research will be increasingly important to the improvement of our standard of living.

"It is to chemistry that we are going to look—by that I mean chemistry in all its aspects. The second half of the twentieth century is going more into the hands of the chemist than in the hands of any other section of the community."

Mr. Chambers started his speech by outlining his efforts to define 'the profession of chemistry'. Although a Ministry of Labour booklet listed 125 professions, it unfortunately did not include chemistry. Three different dictionaries had given conflicting definitions of 'profession' and 'chemistry'. Consulting the law for advice did not help much for 12 months ago there had been much legal discussion at the Polymer Arbitration Tribunal on Key Industry Duties and what was a chemical. It was decided then that "if you polymerise ethylene and get polythene, or polymerise vinyl chlorine and get p.v.c., all of which are chemical processes, then nevertheless what you get are not chemicals according to the law". Mr. Chambers added: "If those are not chemicals I don't know what are".

Outlining his views on chemistry and chemists, he said that there was a "chemical aspect of all substances and a chemical aspect of almost anything we do. Whether the chemist is a university teacher, a research worker or employed in industry and concerned with things produced, he is concerned with the chemical aspects of substances, and in that sense I look on chemistry and I look on chemists.

"If you look at the industrial side, there is a tendency to refer to our industry as the 'chemical industry'. That is perhaps becoming out of date with the widening of the use of chemistry in all industries". Mr. Chambers then spoke of his belief that the future of the second half of the current century would be the era of chemistry.

Replying to the toast, Mr. Herbert declared that the vocation of chemistry was in good heart, well prepared to meet the challenge of the future. He was sure that chemists were ready to accept the opportunities that Mr. Chambers had spoken of "in the way that Ramsay himself would have had us do".

The toast of "The City of Glasgow" was proposed by Dr. F. G. Mann, reader in the Department of Inorganic and Organic Chemistry, Cambridge, on behalf of Professor F. Eméleus, president of the Chemical Society, who was unable to be present. In reply the Lord Provost said that more than 8,000 persons were employed in the chemical industry in Glasgow, or 1.5% of the city's insurable persons; that compared with a figure of 2.36% of insurable persons in England. He felt that there were great opportunities for further development of the chemical industry both in the city of Glasgow and in Scotland.

Process Modernisation by Foster Wheeler Raises Butadiene Capacity at Port Neches

RECENTLY completed by Foster Wheeler Corporation at the Port Neches, Texas, plant of Neches Butane Products Co. is a process modernisation programme which has resulted in a capacity increase of more than 100,000 tons of butadiene a year (2,500 barrels/day). The modernisation plan has included revamping of one of the two existing dehydrogenation sections and the installation of a completely new section. A new 675,000 lb./hr. steam generating plant and a new 20-cell Foster Wheeler cooling tower were the major utility additions required to process the increased product output. Process and mechanical design, procurement and construction were all provided by Foster Wheeler.

Although the specific objective of this programme was increased capacity, the more significant overall plan provided for a lower unit cost for butadiene. This has been accomplished, Foster Wheeler report, mainly by the use of the recently developed dehydrogenation catalysts of Dow Chemical Co., known as Dow Type 'B'.

Largest Plant

The Neches Butane Products plant at Port Neches was the largest plant put into operation in the U.S. Government's synthetic rubber programme. The company was formed in 1942 at the Government's request by the Atlantic Refining Co., Gulf Oil Corporation, the Pure Oil Co., Socony Vacuum Oil Co., and the Texas Co. Design, construction and operation at the Neches plant were the responsibility of these companies. In April 1955, when the U.S. Government sold its rubber and butadiene plants, the Neches plant was purchased jointly by Goodrich-Gulf Chemicals Inc. and Texas-U.S. Chemical Co. As a result of the present modernisation Neches Butane Products Co. with a 300,000 ton-a-year capacity, are still the world's largest producers of butadiene.

Functionally the Port Neches installation is divided into three major operations. These are: Feed preparation, in which all the normal butylenes are concentrated into one stream in order that the feed to the reactors will have a practical maximum of butylene content; dehydrogenation, where the butylene is catalytically dehydrogenated into butadiene; and product recovery, where, by absorption and extractive distillation, 98% plus butadiene is recovered and unreacted butylenes are recycled to the reactor section.

From the nearby Texaco or Gulf refineries butane-butylene feed is obtained which normally contains appreciable quantities of eight different hydrocarbons (propane, isobutane, isobutylene, butylene-1, normal butane, butylene-2L (trans), butylene-2H (cis) and pentane. There are thus two major boiling-point groups: butylene-1 and lighter, and normal butane and heavier.

Feed Preparation. The two boiling-point groups are separated in the prefractionator (1). Bottoms from this tower are fractionated in the depentaniser (2) where the pentanes are removed as bottoms. Next comes a combination furfural extractive distillation column and stripping section (3) which separates the normal butane from the two high-boiling point butylenes which are removed by stripping the fat furfural solution. The sulphuric acid-isobutylene extraction section (4) follows where this hydrocarbon, too close in boiling point to be separated from butylene-1 by fractionation, is removed by the sulphuric acid extraction process. The isobutylene is removed as polymer, mostly dimers and trimers.

Another combination furfural extractive distillation column and stripping section (5) comes next, which separates the effluent from the isobutylene extraction section into isobutane and lighter and butylene-1 as the stripper product. Butylene-2 and butylene-1 streams join and are rerun in a further column (6) to provide a high-concentration butylene as feed to the reactor section. The butylene-2 recycle is also fed to this same rerun column and the butylene-1 recycle enters the reactor via the butylene heater.

There are 12 reactors at the Neches plant using Dow catalyst, which are operated in pairs of two, one reacting and one regenerating. Each reactor is on stream 15 minutes and is then regenerated. Hydraulically-operated valves, some as large as 36 in. in diameter, open and close automatically to provide the desired flexibility for this continuous cyclic regenerative system. Twenty volumes of superheated steam to one volume of preheated butylene feed mix in the top of the reactor 'on stream' at an average temperature of 1200°F. Appreciable heat recovery takes place in waste heat boilers and the partially-cooled mixture of reaction products and steam passes through the steam condenser and then to a condensate-separating drum. The mixed reaction products enter the compressor.

Dehydrogenation Section. In the dehydrogenation section is a steam superheater (7), a butylene feed heater (8) and an air preheater (9), together with the two catalytic dehydrogenator reactors (10 and 11) filled with the Dow Type 'B' catalyst pellets.

Product Recovery. In a combination oil-absorption column and stripping section (12), butadiene and unreacted butylenes are absorbed in the oil and removed at the stripping section. Lighter products, formed in the reaction, pass out at the top of this column to plant fuel gas. The following column (13) further concentrates the butylene-butadiene content of the stream from the stripping section of the preceding column (12). The top-of-column product from this last column (13) is recycled to the previous column (12) for maximum recovery of butylene and separation of lighter hydrocarbons. A further column (14) separates a butylene-1-butadiene product as top-of-column product and a mixture of butylene-2's as bottoms.

Another combination furfural extractive distillation column and stripping section (15) follows which separates butylene-1 from the butadiene. The butylene-1 is recycled to the butylene feedheaters to the reactors. A relatively small portion of this recycle stream, which may contain some isobutane and isobutylene, returns to the feed entering the prefractionator. The purpose of this re-running is to minimise the build-up of these non-reactive hydrocarbons in the reaction system. A final column (16) fractionates the concentrated butadiene stream from the previous column stripper (15), producing as the desired product a 98% plus butadiene. Bottoms from columns No. 16 and 14 are recycled for re-running in column No. 6 before being fed to the reactors.

Solder Flux Based on Polyethylene Glycol

EXPERIMENTS carried out by W. R. Lewis, assistant director of the Tin Research Institute, Fraser Road, Greenford, Middlesex, have resulted in a new soldering process using polyethylene glycol in which the flux spreads more smoothly and there is a 'virtual absence' of spattering compared with a flux based on water; neither is there violent boiling when the flux comes into contact with a hot soldering bit and molten solder.

In conducting the experiments, Mr. Lewis used polyethylene glycol, now commercially available, in place of acidified water, as a vehicle for the acid fluxes.

Spreading smoothly and quietly, the flux covers an area of plain steel nearly twice as large as that covered by a corresponding water flux, with the solder following closely. Experiments showed that whereas the water flux caused severe rusting and corrosion after standing for a few days there was no appreciable corrosion when polyethylene glycol flux was used.

Polyethylene glycol was found to function excellently as a vehicle for such soldering fluxes as hydrazine hydrochloride and bromides, organic amine hydrochlorides, and acidified resinous fluxes, as well as the commonly used zinc chloride.

Advantages were also found in the use of polyethylene glycol as an alternative to ethyl alcohol as a medium for resinous soldering flux. Its much lower volatility avoids evaporation of the solvent which occurs when alcohol is used in the vicinity of solder dipping-baths and other hot localities.

Overseas News

ITALIAN HOME SALES OF SULPHUR INCREASE; MERCURY OUTPUT SHOWS 35% DROP

THE Italian Sulphur Board (E.Z.I.) had in its warehouses stocks of 233,373 tons of sulphur by September last, practically the same as the stock held by that month of 1958. In July and August E.Z.I. delivered to purchasers 14,015 tons, or about 3.5% less than the quantity marketed for the period a year earlier.

July and August 1959 sales were subdivided: home market (Italy) 11,893 tons, to Austria 502 tons, Tunisia 580 tons, Morocco 1,000 tons, Fiji 39 tons. The drop in exports was nearly compensated for by the increase in home sales.

Exports of synthetic rubber from A.N.I.C.'s factory at Ravenna totalled 17,513 tons during January/September 1959.

During the period January/August 1959 a total of 957 tons of quicksilver was produced, about 35% less than the output recorded during the corresponding period of 1958.

Imports (temporary) of chloride of ethylene and heptane have been subjected to an increased time limit, to 26 February and 10 February respectively. (Temporary imports of ethylene chloride are permitted for production of tetraethyl lead mixtures, while heptane imports are allowed for production of tyres and other rubber articles).

Record Turnover For U.S. Chemical Industry ?

According to various statements made at a meeting of the Manufacturing Chemists' Association in New York, the U.S. chemical industry is hoping for the record sales figure in the current year of $24,000 million. Previous record was $23,400 million in 1957. The chemical industry, it was stated, suffered less in the 1957-1958 recession than other industries and made a quicker comeback.

Large Trade Pact between East Berlin and U.S.S.R.

Described as the 'world's biggest trade agreement,' a pact has been signed in East Berlin by representatives of the Soviet Union and the East German Republic, covering mutual trade between the two countries for the six-year period 1960-1965. It will result in a total trade volume for the period of some 42,500 million roubles*. Chemicals share second place with shipping on the list of proposed exports from East Germany to Russia; 2,000 million roubles' worth will be sold under the plan period to the Soviet Union, of which 265 million roubles' worth will be exported during the coming year. Machine plant, including chemical plant, will be sold in the same direction worth a total of 16,000 million roubles, 2,000 million roubles' worth for delivery in 1960. The Soviet Union will in its turn supply to East Germany, among other commodities, some 17 million tonnes of mineral oil (1,160,000 tonnes in 1960), a considerable proportion of which will be used for petrochemical production.

* *The rouble converts in relation to £ sterling at rates between some 11 and 27 roubles/£.*

Franco Inaugurates Nitrogen Fertiliser Plant

The new nitrogen fertiliser plant of the I.N.I. Co. Empresa Nacional Calvo Sotelo in the province of Cuidad Real was inaugurated by General Franco last month. The plant, which will have an annual production capacity of 80,000 tons, is similar to that inaugurated at Puentes de Garcia Rodriguez in September. With the new plants the firm hopes to achieve an output of some 323,300 tons of fertiliser annually.

Common Market to Invest in Sicilian Chemical Projects

The European Investment Bank, the Brussels-based finance body comprising members from the six countries of the Common Market, is considering the financing together with the World Bank of two chemical projects in the south of Sicily. These are a plant for the production of ethylene in Priolo, which will cost a total of some $7 million, and one for the production of plastics from ethylene derivatives in the same area, to cost about $4 million.

Hungary Orders Two Caustic Soda Plants from France

In October, Komplex Trading Co., Budapest, bought complete equipments for two caustic soda plants from Krebs Cie., Paris. One of the plants is to be installed at the Hungaria Chemical Works, Budapest, while the other will go to Berente in northeast Hungary. The value of the plants is about $2 million. Annual capacity of each caustic soda plant is about 10,000 tons. The plant at Hungaria Works is scheduled to go into operation in the first quarter of 1962, while the one for the Berente works is to be operated by the second half of the same year.

Tenders Sought for Indian Streptomycin Plant

An important tender has been issued by the nationalised Indian company Hindustan Antibiotics Ltd. for a streptomycin plant. Tenders are to be in by dates in January and February next. Forms for the tender, which concerns one steam boiler, one drying and sterilisation tunnel for glass tubes; one automatic labelling machine for glass tubes, dust filters, a hydrogen gas generator, washing plant, installation for the vacuum drying of sterile powder, an ammonia spiral cooler, ventilators for water-cooling tower attached to cooling plant, armatures, an automatic cleaning machine for glass tubes and an automatic filling machine for glass tubes, are obtainable from the India Store Department, Government Building, Bromyard Avenue, Acton, London W.3, at a cost of U.S.$2 per set. Offers are accepted by the India Supply Mission, 2356 Massachusetts Avenue N.W., Washington 8, D.C.

U.S. Chemical Market Research In Europe

"Expansion and diversification studies, foreign technical liaison, joint ventures, and marketing and economic research" projects are proposed by Robert S. First Inc., industrial consultants, 6 East 39th Street, New York 16, N.Y., who also plan a 'Multiple Client Survey' of European methods and techniques of processing plastics materials. The schemes, to commence in the new year, are stated to be "modest in cost and personalised in approach."

A continuous European scouting service will be opened to six non-competing companies in the chemical, plastics and allied industries; and a joint project on the placing of research contracts in Austria with Dr. Werner Kreidl will be put in hand.

The survey of methods and techniques will be priced at $5,000 (U.S.) to those subscribing before 15 December, and $6,000 to those who join later.

Italian Synthetic Rubber for China

E.N.I. have signed an agreement with the Chinese Government whereby their affiliate A.N.I.C. of Ravenna will supply to China a consignment of chemical fertilisers and 10,000 tons of synthetic rubber. The synthetic rubber plant at Ravenna is currently marketing about 35,000 tons a year, of which 20,000 tons goes to the Italian market.

Sodium Cyanide Plant for Shawinigan Chemicals

The Shawinigan Water and Power Co., which controls Shawinigan Chemicals Ltd., reports that the chemical firm's earnings for the first nine months of 1959 were "substantially improved over the same period of last year". Present demands indicate that the company's plant should operate at capacity during the last quarter of 1959.

Construction of a sodium cyanide plant has been started at the Shawinigan East site. Culmination of several years of research and pilot plant work, the plant is being constructed by the Shawinigan Engineering Co.

Activity at B. A. Shawinigan Ltd. continues at a high level, and 20% increase in the plant's productive capacity for

phenol and acetone is under way at Montreal East.

Shawinigan Resins Corporation, of Springfield, Massachusetts, jointly owned with Monsanto Chemical Co., are presently doubling their productive capacity for Gelvatol resins.

Natural Gas Recovery Plant for Canadian Petrochemical Firm

Production for the latest period by Jefferson Lake Petrochemicals of Canada totalled 34,195 long tons of sulphur, and sales and shipments came to 30,976 long tons.

A site has been purchased for a new plant and facilities to recover liquid products and sulphur from the gas of the East Calgary fields to be situated on Canadian Pacific Railway and the Calgary-Vancouver highway.

Completion of the work is scheduled for November 1960 when Westcoast Transmission Co. is scheduled to begin taking pipeline gas at the rate of approximately 100 million cu. ft. per day.

Pakistan Plans to Import Urea

East Pakistan is to import 15,000 tons of urea, a spokesman of the Central Government's Ministry of Food and Agriculture stated. He was denying a report that the Government had stopped imports of fertiliser.

New Phenol Plant for Dow Chemical

Dow Chemical are to build a 36 million lb./year phenol plant in the Pacific North-west, either in Riget Sound or Portland, Ore., area. This plant is scheduled to be on stream by early 1961.

In Canada, Dow Chemical of Canada have selected Vancouver, B.C., as the site of their new phenol plant. Construction of the 24 million lb./year plant is expected to begin next spring.

Reason for the building of two phenol plants so close together is tariff laws, which make it uneconomical to ship phenol across the border. Only other major Canadian phenol producer are Shawinigan in the Montreal area.

Spain Ships Toluene to Britain

A shipment of 520 tons of toluene was made to the U.K. in November by Empresa Nacional Siderurgica S.A. The firm also made its first shipment of 750 tons of benzene to Hamburg in the past month.

Nylon Imports Cause Price Reductions in U.S.

E. I. du Pont de Nemours and Co. and Chemstrand have reduced prices of 15 denier nylon tricot by about 21%, from $5.10/lb. to $4.00/lb. Reason given for these price reductions is imports of nylon.

Also causing concern are imports of other chemicals. Chlorinated solvents, including trichloroethylene, perchloroethylene, and some carbon tetrachloride, shipped, it is stated, from British and Italian ports, are selling at several cents per pound below the U.S. market price. U.S. tank car price for trichloroethylene is 12 cents/lb.; perchloroethylene 11¼ cents; and carbon tetrachloride 10¼ cents.

West German Polythene Plant for Russia

The Salzgitter, West German, firm of Berg- und Hüttenbetriebe AG, have signed a contract with the import purchasing body of the Soviet Union Government, Techmaschinimport, under which it will supply plant for a polythene unit with a 24,000-tonne annual production capacity.

Germany Completes Nitrogen Plant in Spain

A new nitrogen plant, erected by the Lurgi chemical construction firm of Frankfurt-on-Main, and the Badische Anilin- und Soda-Fabrik AG chemical company of Ludwigshafen-on-Rhine, has been handed over to its future operators, Empresa Nacional Calvo Sotelo, of Madrid. The plant, at Puertollano in Spain, has an annual production capacity of 15,000 tonnes of nitrogen.

Israel Firm Enters Polythene Field

The Israeli concern, Makhteshim Chemical Works Ltd., which recently started production of synthetic resins, is now to open a polythene plant, raw materials for which will come from the nearby Haifa oil refinery.

$1 m. Oxygen Plant Order for L'Air Liquide

L'Air Liquide, manufacturing affiliates of Canadian Liquid Air Co., announce that they have been awarded a contract for an Oxyton (tonnage-type) oxygen plant costing close to $1 million for Canadian Chemical Co., Edmonton.

Jap Power for Pakistan

The Pakistan Industrial Development Corporation has signed a contract with Mitsubishi Heavy Industries Reorganised Ltd. of Japan for the setting up of a 36,000 kW power station for the fertiliser factory at Fenchunganj in East Pakistan.

Cyanamid's 66,000-ton Urea Plant on Stream in Canada is Based on New Chemico Process

ON stream at Hamilton Bay, Ontario, is Cyanamid of Canada's multi-million dollar urea plant which obtains its raw materials from the neighbouring Dominion Foundries and Steel Co. Ltd. (Dofasco). Rated level is 66,000 tons of urea a year. Also more than 52,500 tons of ammonia annually will be produced, most of which will go into the urea process.

Basic raw materials for making urea—hydrogen, nitrogen and carbon dioxide—are extracted from Dofasco's gaseous by-products. From blast furnace gas Cyanamid take out CO_2 by amine scrubbing. The stripped furnace gas has all the heating value of the pretreated gas and is returned to Dofasco for use as fuel. Cyanamid also takes steam at 120,000 lb./hour from an extension of Dofasco's steam plant. Recovery of CO_2 is effected by regenerating the amine by steam heating. About 0.8 lb. of CO_2 is needed to make 1 lb. urea.

Hydrogen is extracted from Dofasco's coke oven gas which contains about 56% H_2. While common to Europe this process is stated to be new in Canada. Prepurification at 200 p.s.i.g. removes chiefly CO_2 and H_2S leaving methane, CO and H_2. Cooling to −320°F in a German Linde low-temperature unit liquefies the hydrocarbons (mostly methane).

Heart of Dofasco's oxygen process for making high-quality steel are two 100 ton/day L'Air Liquide oxygen plants plus a new 150-ton unit furnishing nitrogen. Part is liquefied after compression to 2,900 p.s.i.g. for a liquid nitrogen scrub which removes CO in the purification of hydrogen from coke oven gas after hydrocarbon separation. Additional nitrogen is added to the purified hydrogen to adjust the $H_2:N_2$ ratio to 3:1. And the mixture sent to the ammonia synthesis unit.

Liquefied hydrocarbons, representing 75% of the heating value of Dofasco's coke oven gas, are evaporated to atmospheric pressure and returned to the steel company for heating purposes.

A Chemico synthesis unit is employed to produce ammonia under 5,000 p.s.i.g., using a Cyanamid-developed promoted iron catalyst at 500°C. Conversion rate is about 20% per pass. NH_3 is recovered as a liquid by water-cooling and the balance of the mixture is recycled with make-up gas.

For this new plant Chemico developed a novel urea process. Ammonia and CO_2 are combined in two continuous autoclaves, each 4.5 ft. in diameter and 44 ft. long, at 175° to 185°C and under 4,100 p.s.i.g. A 200% excess of NH_3 gives a 75% yield from the CO_2, although the theoretical amount of ammonia gives a yield of only 40 to 50%, report Cyanamid. Silver worth $45,000 lines the interiors of the autoclaves as protection against corrosion and is claimed as the world's largest silver-plating application.

The urea solution resulting contains 20% water of reaction. Ammonia flashes off at reduced pressure. After heating in a carbamate decomposer, the urea is concentrated and prilled to make fertiliser grade material.

As well as solid urea, Cyanamid will produce urea/ammonia solutions. The greater part of the output will go to agriculture and industry in continental North America. About 75% of this U.S. and Canadian consumption will be as fertiliser and animal feed supplement. The remainder will go into textiles, paper, wood products, resins and pharmaceuticals. Some 12,000 tons a year of ammonia in excess after production of urea will be available for other purposes, Cyanamid report.

Chemist's Bookshelf

HIGH STANDARD MAINTAINED IN PART 2 OF HOUBEN-WEYL

METHODEN DER ORGANISCHEN CHEMIE (HOUBEN-WEYL). Edited by *E. Müller*, with the assistance of several distinguished collaborators. Vol. I, Part 2, General Laboratory Practice. Fourth Edit. newly revised, pp. xlv + 1,017. Georg Thieme Verlag, Stuttgart. 1959. DM.196. (subscription price DM.176.40).

The previous instalment in the revision and enlargement of the well-known "Houben-Weyl" was reviewed in CHEMICAL AGE, 1959, **81**, 288, where a tribute was paid to the high standard of this treatise. It can be stated at the outset that this excellence has been fully maintained in the latest part of this mammoth work, which is entitled 'General Laboratory Practice.' Once again, laboratory experimentalists, and in this case chemical technologists as well, will welcome a valuable source of techniques for the multitude of operations carried out by them.

This latest issue is sub-divided into four parts: (a) methods of disintegration and dispersion of matter. (b) general laboratory methods, (c) accessory materials in laboratory techniques, and (d) prevention of accidents (with a subsection on carcinogenic substances).

Small Particles

Procedures for breaking up matter into small particles are dealt with in the first part (185 pages). All the known methods are discussed, with descriptions and illustrations of machinery and apparatus used in powdering, pulverising, pulping, etc. Various procedures for sifting and separating are described, and there is a section on corn analysis. Dispersion of finely-divided matter in fluids is covered. Emulsification and emulsions are discussed exhaustively, and finally there is a short section on foams and their control. The part as a whole will be of greatest help to technological chemists.

Part two (583 pages) gives an exhaustive account of general laboratory methods, ranging from the measurement of rates of flow of liquids, and the preparation, purification, drying and storage of gases, to work with gas streams and in liquefied gases. Methods for the exclusion of oxygen and water-vapour from reactions are outlined. Handling of explosive materials is described, and a section is devoted to working with small quantities of materials. There follow a long discourse on high-pressure and vacuum reaction techniques, and finally the familiar operations of heating and cooling, and the allied measurement, recording and regulation of temperature. This part will be welcomed by the research chemist.

The third part (123 pages) describes the properties and procedures for the purification and drying of a wide range of commonly used organic solvents. Companion with this is a section on the properties and uses of the better-known drying agents.

Finally, part four (52 pages) gives some useful advice about avoiding accidents; first-aid treatment for all types of mishap in the laboratory is described. Included here is a warning chapter on materials encountered in the laboratory or chemical works which are known to have a carcinogenic action.

There are extensive tables, diagrams, graphs, and photographs. and comprehensive author and subject indexes. The literature is covered at least up to the end of 1957. Again, the extent of the literature covered can be imagined when it is noted that there are 30 pages of journals, arranged in alphabetical order, with their abbreviated titles.

Reproduction is excellent, although mention might be made of faults on pages 710-711, 714-715, and 718-719. Errors are exceptionally few. The price is reasonable, considering the high quality of the work, though as observed previously, this series of volumes will chiefly find its way into libraries, research institution, and the like.

A. R. PINDER.

Important Publication on Catalytic Reactions Involving Hydrocarbons

CATALYSIS. Vol. VI. Alkylation, Isomerisation, Polymerisation, Cracking and Hydroreforming. Edited by *P. H. Emmett*. Reinhold, New York, and Chapman and Hall Ltd., London. 1958. Pp: vi + 706. 156s.

This volume deals with various types of catalytic reactions involving hydrocarbons which are very important in practice and which are chiefly carried out over catalysts with acidic character. Consequently, it is not surprising that the authors of four of the six chapters are associated with industrial establishments and not university departments.

R. M. Kennedy deals with the catalytic alkylation of paraffins with olefins. Reactions of this type involve carbonium ions and are catalysed by acids like hydrogen fluoride and sulphuric acid, and also by substances such as aluminium trichloride and boron trifluoride. The chapter gives a good account of the types of products which are obtained and also of the way in which the various primary and secondary reactions can be related to the properties of the carbonium ions and to the hydrogen ion transfer processes which occur readily in acid media. In the second chapter, F. E. Condon described the catalytic isomerisation of hydrocarbons which, like the first type of reaction, is usually accomplished over acidic catalysts although often at rather higher temperatures. This chapter is particularly well documented, containing over 300 references and the emphasis is on the more fundamental aspects of the subject, i.e. the thermodynamics, kinetics and mechanism rather than on the applications.

The next two chapters cover polymerisation. The first of these by R. Simha and L. A. Wall is the more extensive and covers most of the more fundamental topics. The account is necessarily rather compressed but it is comprehensive and notable features are the sections dealing with recent work, firstly on initiation by atomic radiations and, secondly, on the degradations and other changes resulting from the effect of such radiations on polymer molecules. The second chapter by A. G. Obland, G. A. Mills and H. Heinemann is concerned with a more specific topic—the polymerisation of olefins to liquid polymers. Apart from sections on thermodynamics and the mechanism of cationic hydrocarbon polymerisation reactions, the chapter is chiefly devoted to an account of the industrial applications.

An excellent chapter on Catalytic Cracking by H. H. Voge follows. He covers both the fundamental work which has been carried out in order to elucidate the mechanism of the reactions and also the kinetics found with 'fixed bed' and 'fluid' systems, as well as other aspects of importance in the applications of catalytic cracking. The final chapter by F. G. Ciapetta, R. M. Dobres and R. W. Baker entitled Catalytic Reforming of Pure Hydrocarbons and Petroleum Naphthenes deals with some of the various new processes which have been developed in the last 15 or 20 years. The essential feature of the type of catalysts employed in these processes is their capacity to bring out hydrogenation or dehydrogenation in addition to isomerisation and cracking. The authors have produced an interesting and readable account of catalytic reforming, although it is almost certainly not comprehensive because of the reluctance of organisations to publish all the available information in this competitive field.

Taken as a whole, the volume is undoubtedly a most important publication. There is a little duplication of material in some of the chapters, but this is inevitable since the principal mechanisms for alkylation, isomerisation and cracking depend on the same entity, the carboninum ion. The illustrations and the tables are well designed and there is both an author index and a subject index. It is a pity that one of the six chapters differs in style from the others in not listing the references in alphabetical order, but this is a minor criticism. The price is high, and higher than Volume V, but the price per page has been maintained constant.

C. KEMBALL.

Chemist's Bookshelf

Finar—Modern Equivalent of Classical Textbooks of Organic Chemistry

ORGANIC CHEMISTRY. Vol. I. 3rd Edit. by *I. L. Finar*. Longmans, Green and Co. Ltd., London, 1959. Pp. xv + 822. 45s.

Many textbooks of general organic chemistry have appeared during the past decade, but few can have made such an impact on the teaching of organic chemistry in this country as "Finar". Here is a general textbook which most teachers of organic chemistry would warmly recommend to their students. It is one of the very few general textbooks which combines the factual details of organic chemistry with modern electronic theory. As a result "Finar" has, in the eight years which have elapsed since its first publication, become a recognised textbook for students reading chemistry to Honours standard.

The second enlarged edition of this book appeared in 1954 and its subsequent publishing history—it was reprinted in 1955, 1956, and 1957—testifies not only to its popularity but also to its excellence as a student textbook. A companion volume dealing with stereochemistry and the chemistry of natural products appeared in 1956 and this is essentially a continuation of what is now termed Volume I—the present volume—dealing with the fundamental principles of organic chemistry.

Additions to Text

In the present text, Dr. Finar maintains his high standing as an author; his revision has been more than conscientious. The new edition retains all the good features of its predecessors, but the value of the book has been considerably enhanced by the many changes and additions to the text. Among the more important changes which have been made, the sections on dipole moments, resonance, S_i and S_n mechanisms, hyperconjugation, organo-lithium compounds, aromatic substitution, and transition states have been rewritten. The chapters on stereochemistry, carbohydrates, tautomerism, and heterocyclic compounds have been enlarged considerably. Material included for the first time is the use of isotopes in organic reactions, molecular diagrams, molecular crowding, E_1 and E_2 mechanisms, inclusion complexes, ferrocene, *ortho-para*-ratio in aromatic substitution, and *cyclo*alkynes. All the aromatic systems have now been rewritten with double bonds.

Throughout the text, the mechanisms of the particular reactions are given using the more recent methods of depicting them. These and the discussions of steric effects (which are also given considerable prominence) are integrated so well into the factual accounts of the numerous organic reactions and classes of organic compounds that the reader can readily appreciate the many factors involved in the general chemistry of carbon compounds.

Obviously, it is impossible to please everybody, but Dr. Finar has done the next best thing. Even if a few of the more erudite topics are given only scant attention, the discerning student will find the reading references more than adequate to satiate his desire for further knowledge. If subsequent editions maintain this high standard, then "Finar" must undoubtedly become the modern equivalent of the classical textbooks of organic chemistry. In conclusion, the publishers are to be congratulated on the high standard of presentation; it is remarkable that the increase in price since the second edition is only five shillings—a shilling a year—yet the text is increased by some 90 pages.

WILLIAM I. STEPHEN.

Q.V.F.'s Glass Cooling Plant for Sulphuric Acid

A NEW range of sulphuric acid cooling plant incorporating cooling pipes made of borosilicate glass and an entirely new design of pipe coupling is available from Q.V.F. Ltd.

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Scottish Agricultural Industries, designed the pipe coupling and evolved the use of glass coolers for sulphuric acid (CHEMICAL AGE, 14 November, p. 685). This pipe coupling is a moulded rubber sleeve fitting the ends of the glass sections.

Improved water distribution and thermo performance are claimed as a result of using the new coupling, and the whole system is said to be free from stress and any leakage.

Timely Survey of Work on Liquids and Liquid Mixtures

LIQUIDS AND LIQUID MIXTURES. By *J. S. Rowlinson*. Butterworths Scientific Publications, London. 1959. Pp. ix + 360. 75s.

Mixtures of liquids find many applications in chemical and physical processes. Properties such as vapour pressure, heat capacity and azeotrope formation and parameters such as latent heats and critical points are of great interest to both industrial and research chemists and their estimation and interpretation are of considerable importance. The last decade has seen much experimental and theoretical work on the subject, much of which is considered in this very timely book.

Treatment of liquid mixtures is based on theories of pure liquids and the first third of the book is concerned with equilibrium properties of pure liquids. Consideration of the liquid state is followed by a summary of applicable thermodynamic relationships and sections on vapour pressure, such mechanical properties as thermal expansion and isothermal compressibility, heat capacities and adiabatic and other properties. Discussion of the critical state includes the thermodynamics of the critical point, heat capacities at constant volume and fluctuations.

A further third, concerned with liquid mixtures, deals successively with those involving simple and more complex liquids. The thermodynamics of each class is outlined and their equilibrium properties considered in terms of excess thermodynamic functions. More qualitative discussion of mixtures at high pressures includes consideration of azeotropy, latent heats, gas-liquid critical states and critical points. The bulk of the experimental work on liquid mixtures is cited, the results given and often critically discussed.

The remainder of the book deals with interpretation of experimental results in terms of intermolecular forces. Treatment of all theories of liquids and mixtures is not attempted but the author develops the statistical thermodynamics common to all and restricts the account to results directly comparable with experiment. Theories are made as dependent as possible on those applicable to pure liquids.

Colligative properties of ideal dilute solutions, polymer solutions and surface properties of liquids are not discussed since, as the author points out, these are dealt with in other works. More empirical treatments of liquid mixtures and specialised treatments of mixtures of polar liquids are only briefly mentioned. Experimental methods are generally only given in outline. However, the book is extremely well documented with references and these, with the large number of experimental results given and discussed, provide a very good survey of work on the subject.

There are many clear diagrams and useful tables and two appendices. Indices of the subjects and systems discussed are given but it is perhaps a pity that no author index is provided. This, however, is a minor criticism and the author has provided an account which will be of great value, not only to workers in this field but also to all chemists and physicists concerned with liquids and liquid mixtures. Much of the experimental work cited comes from the literature of chemical engineering and chemical engineers will find the book of considerable interest.

W. R. MOORE.

Fuel Efficiency Diary

Edited by H. B. Locke, A.M.Chem.E., A.M.Inst.F., an Industrial Fuel Efficiency Diary for 1960 is available from H. O. Quinn Ltd., 151 Fleet Street, London E.C.4, price 8s 6d to 13s 6d according to binding. The volume measures 3½ in. by 5½ in. and contains 110 pages in which new data has been added, dealing with physical information, fluid flow, fuels, combustion, steam raising and furnaces, prime movers, etc. There is an index and new charts and nomographs.

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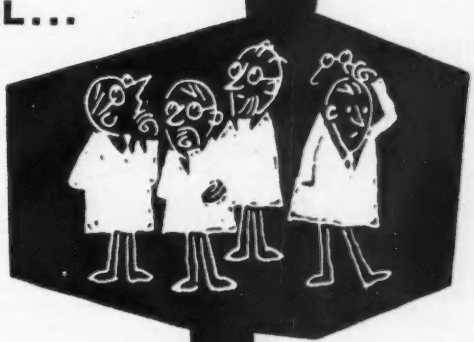

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VALUABLE REFERENCE WORK ON POLYMER CHARACTERISATION TECHNIQUES

TECHNIQUES OF POLYMER CHARACTERIZATION. Edited by *P. W. Allen*. Butterworths Scientific Publications, London. 1959. Pp. xiv + 256. 50s.

Butterworths Scientific Publications have published several books in recent years which have set a new standard in polymer literature and the present volume is a worthy addition to their list. For the second time in this series they have published the work of a team of well qualified men under the guidance of a more than competent editor and if readers find the pattern of the individual chapters somewhat stereotyped this is only because the same admirable layout has been found suitable for each section of the work.

As with earlier volumes, the text is a critical survey of a field and thus, automatically, a most valuable feature is the extensive list of references, valuable that is, if the proofs have been carefully checked. The reviewer has spent some little time cross checking and readers may be assured that the authors have been as careful in this duty as they have with the text itself.

Techniques of polymer characterisation are mainly concerned with the behaviour of dilute solutions, the preparation of which, as Professor Gee remarks in the Foreword, is full of pitfalls for the unwary. P. W. Allen, who edits the book, writes an introductory chapter which shows how many of the pitfalls may be avoided and sets a pattern for his colleagues. Briefly, the team consists of R. W. Hall on Fractionation, H. T. Hookway on Osmometry and D. F. Rushman on other methods for the determination of number-average molecular weights. F. W. Peaker contributes a chapter on Light Scattering techniques and P. F. Onyon one on Viscometry. The two final chapters are by way of appendices, one by G. F. Price on End Group analysis and the other by R. J. Ceresa on block and graft copolymer characterisation.

The general layout is that each author gives a brief theoretical introduction and then describes in considerable detail the apparatus and methods which have been used by various research workers. Not only is the text adequate technically but the laboratory technician will be particularly grateful for the names and addresses which are given of the suppliers of various items of equipment. Each chapter concludes with a section devoted to the interpretation of results and this is where the reviewer's main criticism arises. The book appears to have been produced to conform with a series both as to size and price and this is unfortunate. At 50s a post-graduate laboratory handbook is cheap and if the text had been extended further into the results which have been achieved in the characterisation of specific polymers by the methods described, it would still have been well worth the extra costs which such an enlargement would have entailed.

Except for the last two chapters, which will be of interest to many outside the research laboratory, the book is essentially one for the post-graduate actively interested in fundamental research. Introductions to the theories involved are too short to include the detailed development of formulae fundamental to physical chemistry considerations, it being assumed that the user of the book will have studied these matters already and the text is merely a refresher course in its introductory paragraphs. The descriptions and the clear diagrams of the various forms of apparatus used are excellent and any research worker will be grateful to find so much guidance between the covers of one volume.

J. H. COLLINS.

First Systematic Account of Methods Based on the Wiener-Hopf Technique

THE WIENER-HOPF TECHNIQUE. By *B. Noble*. Pergamon Press, London. 1958. 65s.

The Wiener-Hopf technique was devised originally to solve integral equations of the type $\int_0^\infty f(\xi)\, k(x-\xi)\, d\xi = g(x)$ where $0 < x < \infty$ and $f(x)$ is the unknown function, but it was subsequently realised that the technique could be used to solve a much wider range of problems involving partial differential equations. The types of problems for which the technique is effective are very diverse but perhaps a typical example is a problem requiring the solution of the steady-state wave equation in free space containing semi-infinite boundaries. By considerable compression of material, Mr. Noble has been able to include the solutions of a large number of problems which arise in electromagnetism, acoustics, hydrodynamics, electricity, potential theory and heat conduction. Of particular interest is a chapter on approximate methods. The book is entirely mathematical and there is no discussion of the physical interpretation of the solutions.

Mr. Noble's book is the first systematic account of methods based on the Wiener-Hopf technique for the solution of partial differential equations and it succeeds admirably in its aim of providing a reasonably complete survey of the possible applications of the technique. The book assumes a familiarity with the Laplace transform and its complex conversion formula and with integration in the complex plane. The high information content per page does not make for easy reading.

A. DALGARNO.

Overall Picture of Developments in Aromatic Raw Materials

ESSENTIAL OILS AND AROMATIC CHEMICALS. *Council of Scientific and Industrial Research, New Delhi*, 1958. Pp. 174. Rs.10.

In the past, far too little attention has been paid to the wealth of natural products which are available from the subcontinent of India. This collection of papers, presented at a Symposium held at Delita Dun in October 1955, under the joint auspices of C.S.I.R. and the Forest Research Institute and Colleges, goes a long way towards remedying this, particularly in respect of aromatic raw materials. The papers also present an overall picture of the very considerable developments which have taken place over the past 15 years in the perfumery and cosmetic industries in India. It is hoped that such contributions to scientific literature will become a regular feature.

Following the lines of the symposium, the book is divided into three sections under the headings of General Topics, Cultivation and Chemical. The first section consists of 21 papers dealing with widely differing topics ranging from the purely academic to the highly practical. The second section is a short one and consists of only four papers dealing with the problems of raising aromatic plants under a wide variety of climatic conditions. The final section is the longest and consists of 27 papers and 17 abstracts of communications already published elsewhere. To attempt to reduce the content of these to a few lines in a short review would indeed be an impossible task; but all of them are worthy of close study by all associated with the technical handling of essential oils both in industry and research.

Although an author index is included, the book would have been improved by the addition of a subject index. Without doubt, discussions would have taken place during the course of the symposium; what a pity that these were not recorded and included either after the appropriate paper or as an appendix. Such discussions often considerably enhance the value of the original contribution.

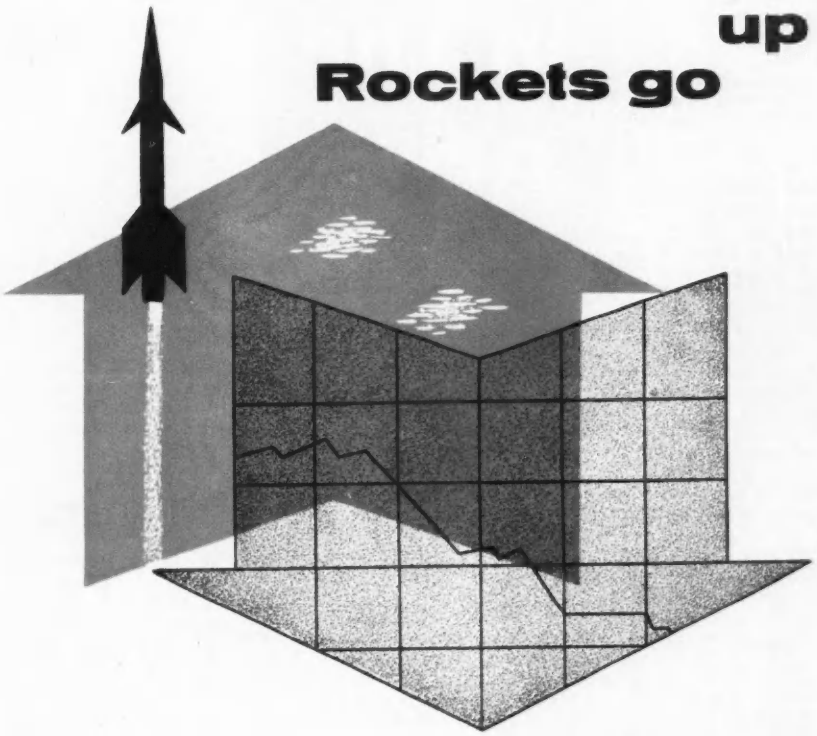
H. B. HEATH.

U.K.-Euratom Link in Fusion Research

SUGGESTIONS for co-operation between A.E.A. and Euratom on fast breeder reactor techniques were considered at the recent first meeting of the Continuing Committee for Co-operation, when progress made since the signing of the U.K.-Euratom agreement last February was discussed.

A Press communique outlining the meeting was issued on 4 December which contains reference to a proposed technical meeting on advanced gas-cooled reactors and describes agreement for further co-operation in the peaceful uses of atomic energy. The preliminary technical meeting will be held in January 1960.

Rockets go up



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PEOPLE in the news

● **Mr. D. G. Emerson,** director of the Alkali Division of I.C.I., recently returned on the *Queen Mary* from a business trip to New York. He was accompanied on the visit by his wife. **Mr. W. E. O. Walker-Leigh** and his wife were also aboard. Mr. Walker-Leigh is managing director of Cooper McDougall and Robertson Ltd.

● **Mr. R. A. Banks, B.A.,** Group C (Ammonia and Agriculture), a director of the I.C.I., has been appointed to the board of the Scottish Agricultural Industries.

● **Dr. P. B. D. de la Mare, D.Sc., Ph.D., M.Sc.(N.Z.),** whose appointment to the University Chair of Chemistry at Bedford College was announced in CHEMICAL AGE, 5 December, page 824, was educated at the Hamilton High School, Hamilton, New Zealand, from which he took a New Zealand Junior University Scholarship in 1938. After studying at Victoria University College, Wellington, under Professor P. W. Robertson he obtained the N.Z. degree of M.Sc. in 1942, and was then directed to national service with the N.Z. Department of Agriculture. After the war he took up a University of New Zealand Shirtcliffe Fellowship at University College, London, where he obtained

Dr. P. B. D. de la Mare

his Ph.D., and was awarded the Ramsay Memorial prize and medal for 1948, becoming a member of the academic staff and taking his D.Sc. in 1955.

Author of various significant papers and articles Dr. de la Mare's research work has been mainly in the field of mechanistic organic chemistry.

● **Mr. R. M. Godfrey, B.Sc., A.R.I.C.,** at present development chemist with Forestal Land Timber and Railways Co., takes up a new post as chief chemist with Golden Ltd., of Chesham, Bucks, on 4 January next.

● **Dr. Richard Kenyon** has been appointed editorial director of the American Chemical Society's applied publications effective immediately. He will continue in his present capacity as editor of *Chemical and Engineering News*.

● **Mr. A. W. Holmes,** who was for the past five years deputy ammonia works manager of the I.C.I. Billingham Division has been appointed Prudhoe works manager and will take over at the end of December from **Mr. J. Rigg,** who is being transferred to Heysham. **Dr. B. W. Whipp,** refinery section manager in the oil works, has been transferred to the Heavy Organic Chemicals Division research department as section manager concerned with properties, treatment and testing of petrol. **Mr. G. A. Williams** has succeeded Dr. Whipp as refinery section manager, **Mr. W. J. Peach** has taken over as section manager of the by-products section from Mr. Williams, and **Dr. E. J. Cullen** has succeeded Mr. Peach. **Dr. W. L. Bedwell,** deputy products works manager, has been transferred to the Billingham Division technical department. He is succeeded by **Mr. K. P. Moore.**

● **Professor K. G. Denbigh, M.A., D.Sc.,** Professor of Chemical Technology at Edinburgh University, has been appointed to the Chair of Chemical Engineering Science at the Imperial College of Science and Technology, to take effect from 1 October, 1960.

● Among the passengers on the Union Castle Line flagship *Pendennis Castle* which sailed from Southampton on 3 December was **Mr. A. F. Berk,** managing director of F. W. Berk and Co. Ltd., chemical manufacturers, together with his wife. Also on the ship was **Mr. H. W. Fender,** managing director of Prodorite Ltd.

● At the annual meeting of the British Tar Confederation held on 24 November, **Mr. C. Lord,** chairman of the Lancashire Tar Distillers Ltd., was elected president for the year 1959-60. Mr. L. W. Blundell, controller of by-products, North Thames Gas Board, was nominated honorary treasurer and Lt.-Col. P. F. Benton-Jones, O.B.E., United Coke and Chemicals Co. Ltd., became chairman of the executive board. Vice-chairmen are W. K. Hutchison, deputy chairman of the Gas Council, and Wm. McFarlane, Scottish Tar Distillers Ltd. The executive board consists of ten representatives nominated by each of the Association of Tar Distillers, the British Coking Industry Association and the Gas Council; and one representative nominated by the Low Temperature Coal Distillers Association of Great Britain Ltd. The following constitute the board, representing the A.T.D.: L. W. Blundell, North Thames G.B.; E. P. Butler, Bristol and West Tar Distillers Ltd.; C. E. Carey, S.E.G.B.; E. Hardman, E. Hardman Son and Co. Ltd.; R. T. Hayes, United Coke and Chemicals Co. Ltd.; T. L. Kinton, Printar Industries Ltd.; M. J. R. Lane, Normanby Park Tar Supply Co. Ltd.; C. Lord, Lancashire Tar Distillers Ltd.; Wm. McFarlane and R. B. Robinson of the Midland Tar Distillers Ltd. Representing the British Coking Industry Association are: Lt.-Col. Benton-Jones; K. McK.Cameron, Stanton Iron Works Co. Ltd.; T. G. Craig, O.B.E., T. D. Colvilles Ltd; C. F. Dutton, N.C.B.; J. Y. Feggetter, N.C.B. (Durham Div.); C. M. Frith, South Yorks Chemical Works Ltd.; I. Hall, N.C.B. (N.E. Div.); W. D. Holt, N.C.B. (East Midlands Div.); A. Slater, Staveley Iron and Chemical Co. Ltd.; and C. F. Sullivan, N.C.B. (S.W. Div.). Representing the Gas Council: S. Black, Northern G.B.; R. N. Bruce, O.B.E. (S.E.G.B.); D. D. Burns, O.B.E. (Scottish G.B.); Dr. J. Burns, G.M. (N.T. and Eastern G.Bs.); J. Carr, O.B.E., M.C. (S. and S.W. G.B.); E. H. Harman (E. and W. Midlands G.Bs.); W. Hodkinson, O.B.E. (N.W. G.B.); W. K. Hutchison, C.B.E. (Gas Council); A. McDonald (N.E.G.B.); and J. Powdrill, M.B.E. (Wales G.B.). Representing the L.T. Gas Distillers' Association of G.B. Ltd. is Commander C. Buist.

● **Dr. W. A. Johnson** has been appointed a director of Pure Chemicals Ltd.

● **Dr. G. H. Williams, Ph.D.,** lecturer at King's College, has been appointed to the readership in organic chemistry at Birbeck College.

● **Mr. A. Lewin, B.Sc., A.R.I.C., A.P.I.,** has been elected a fellow of the Plastics Institute. Mr. Lewin is a director of Fibre Form Ltd., Garratt Mills, Earlsfield, London S.W.18.

Dr. C. M. Johnson, whose appointment as director of the Explosives and Research Establishment at Waltham Abbey was announced in C.A., 21 November, p. 744

● Important changes in the Plastics Division of I.C.I. on Tees-side have now been announced. They involve transfer of **Dr. A. M. Block,** Tees-side works manager, to Welwyn as assistant general works manager, and the appointment of **Mr. A. Burness,** the division's assistant works manager at Wilton as his successor at Tees-side.

● **Dr. G. W. C. Milner, D.Sc., F.R.I.C., A.Inst.P.,** senior principal scientist at the Atomic Energy Research Establishment, Harwell, Berks, has been elected chairman of the Physical Methods Group of the Society for Analytical Chemistry for the coming year. Vice chairman is **Dr. W. Cule Davis, Ph.D., D.Sc., F.R.I.C.,** research manager of Associated Chemical Companies Ltd.; hon. secretary and

(*Continued in p.* 869)

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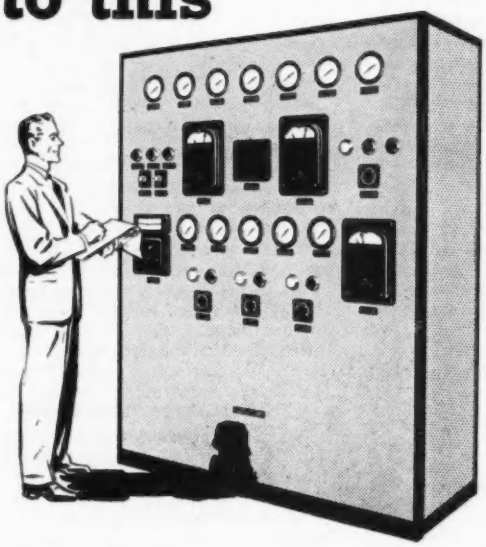

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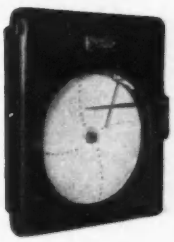

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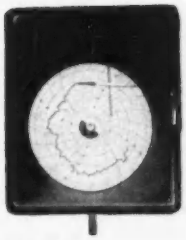
Dial Pressurestat



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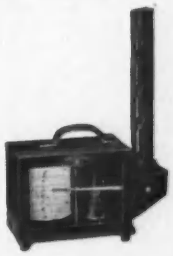

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Commercial News

- Boake Roberts to Increase Share Capital
- S.A.I. Raise Dividend on Higher Profits
- Knapsack to Become a Hoechst Department
- Anglo-Lautaro Dividend and Profits Down

A. Boake Roberts

An extraordinary meeting of A. Boake Roberts and Co. (Holding) is called for 18 December to create 3.6 million 5s ordinary shares and to effect the scrip issue.

Elliott-Automation Ltd.

Progress is being made in negotiations between Elliott-Automation Ltd. and Manufacture de Machines Du Haut-Rhine S.A. of Mulhouse, France, for the former company to manufacture automation equipment in that country. 'Manuhrin', abbreviated title of the French firm, is an old-established engineering business with plant in various parts of France. Elliott-Automation propose to take a financial interest in Manuhrin.

Scottish Agricultural Industries

Scottish Agricultural Industries Ltd., 39 Palmerston Place, Edinburgh 12, are raising the dividend from 10 to 12% with an 8% final for the year ended 30 September. A one-for-one scrip issue will also be made.

Sales of the firm, which is an associate of I.C.I., rose from £23,658,882 to £24,863,605 and profits increased by some £24,000. It is proposed to increase the authorised capital to £6 million.

Cassella Farbwerke Mainkur AG

The dividend of the West German firm of Cassella Farbwerke Mainkur AG, one of Europe's leading manufacturers of dyestuffs, for the current financial year is estimated to be above that achieved in the 1958 financial year (14%). In the first ten months of the year turnover was higher by 21% than that for 1958, and export sales accounted for a large proportion of this. Actual dyestuffs occupied over 50% of Cassella's total turnover, the improvement in the textile industry playing the main part in this favourable development.

Farbwerke Hoechst AG

West German chemical producer Farbwerke Hoechst AG, Frankfurt-on-Main, have decided to assimilate their two 100% chemical industry subsidiaries Knapsack-Griesheim AG and Kalle and Co. AG, which between them have share capital worth £8¼ million. Two companies will be formed bearing the same names as the two subsidiaries have at present and will act as operating companies for the two concerns—which will in effect be Hoechst departments.

Deutsche Erdol

Shareholders of Deutsche Erdöl (D.E.A.) West Germany, have authorised their board to take over control of Rheinpreussen AG. (CHEMICAL AGE, 10 October, p. 492). The board's proposal to acquire 70% of the ordinary shares in Rheinpreussen, at present in the hands of the Haniel family, was approved. Haniel are to be given D.E.A. stocks to be created at the rate of four-for-five. As Rheinpreussen's nominal capital amounts to DM. 100 million (£8.5 million) the new stock to be created amounts to DM. 56 million (£4.8 million) nominal on top of D.E.A.'s present nominal capital of DM.182 million (£15.5 million).

The Haniel family are to offer half of the newly-created stock for sale to the public shortly, and another quarter next year leaving a nominal DM.14 million (£1.2 million). At the Dusseldorf price of 308%, the value of the £42 million nominal to be sold to the public would be about £129.4 million.

Reichhold-Beckacite Chemische

The Vienna chemical company Beckacite Kunstharzfabrik GmbH, one of Austria's leading synthetic resin producers, have changed their name to Reichhold-Beckacite Chemische Fabrik AG. Reichhold-Beckacite are a member of the international Reichhold group.

Anglo-Lautaro

Profits of Anglo-Lautaro Nitrate (Compania Salitrera Anglo-Lautaro) for the year ended 30 June, 1959, were U.S.$3,168,601, or $0.71 per equivalent Class 'A' share, compared with U.S.$4,491,805, or $1.01 per share, for the previous year. The dividend on the 'A' is cut from U.S.$1 to $0.70—corresponding pro rata amounts are payable on the 'B' and 'C' shares.

During the year the company proceeded further with its programme of modernisation of installations designed to bring about cost reductions. It has obtained from the Export-Import Bank an increase in its credit from U.S.$16 million to $20 million to finance this programme.

Despite steps taken to effect reductions, overall production costs have continued to rise because increases in Chilean wages, salaries and prices of locally purchased materials have had to be met without corresponding adjustment in the Chilean exchange rates for foreign currencies realised from sales.

This situation is adversely affecting results for the current year to an even greater degree than during 1958-59.

Schering Corporation

Schering Corporation, Bloomfield, New Jersey, expect their 1959 net profits to reach the level attained last year. In 1960 both turnover and profit will be up by a considerable amount, states the company. In the first three quarters of the current year Schering realised a turnover of $62.9 million, as against a total for the whole of last year of $78.2 million, though the rate of profit was slightly down on that for 1958. A rise of enough size to equal the last year's figures is expected for the fourth quarter. In the current year Schering have brought some 18 new pharmaceutical products on to the market and are to introduce a further three before the end of the year. Research expenditure rose from $6.4 million last year to $7.7 million in the current year and will rise further in 1960.

Market Reports

GOOD HOME INTEREST IN BORAX

LONDON The demand for industrial chemicals has again been fairly active, and the contract movement of the routine soda products has kept up to a satisfactory level. A good inquiry on home account has been reported for borax, boric acid, hydrogen peroxide, formaldehyde and the barium compounds. Export trade activity continues at a good level with a steady flow of inquiry in circulation.

Lower prices are now ruling for certain solvents and plasticisers, and the movements in the prices of non-ferrous metals affect the quotations for the chemical compounds, otherwise the general price position is fairly steady.

Current price for copper sulphate is £78 10s. per ton, less 2% f.o.b. Liverpool.

Among the coal tar products there is a ready outlet for the naphthalenes, whilst cresylic acid and carbolic acid are both active on home and export account.

MANCHESTER There has been a fair flow of inquiries on the Manchester chemical market during the past week and additional bookings have been reported in a wide range of products covering requirements over the early months of next year. Home trade users are still calling for steady deliveries against contracts, although the usual seasonal year-end quietness is likely to be experienced during the next few days. A continued satisfactory movement on overseas account is reported. There is fair activity in several sections of the market for fertiliser materials, with pressure for deliveries of basic slag an outstanding feature.

TRADE NOTES

Pipeline Insulation

A new illustrated booklet recently issued by Expanded Rubber Co. Ltd., Mitcham Road, Croydon, Surrey, explains how Onazote, a form of expanded ebonite, may be used for low temperature insulation of pipe lines and storage vessels. One of the product's most important qualities is its low conductivity —said to be the lowest of any known rigid insulant. Its established 'K' figure is 0.20 B.Th.U./sq. ft. hour °F/in. at a mean temperature of 50°F.

Instruments Catalogue in German

The 15th overseas version of the Negretti and Zambra Ltd. general catalogue in the German language is available from the firm at 122 Regent Street, London W.1.

Borax Products for Agriculture

Two booklets have been produced by Borax Consolidated Ltd., Borax House, Carlisle Place, London S.W.1, describing the firm's range of products in the artificial fertiliser field. Conditions leading to boron deficiency and its diagnosis and cure are explained in the works, which are colour printed.

M and B Research Chemicals

A folder describing laboratory research chemicals produced by May and Baker Ltd., Dagenham, is now available. It is stated that the chemicals have been introduced to provide university and industrial laboratories with a number of compounds previously not generally available but valued in the firm's own research organisation as versatile intermediates.

Pipeline Flange Spreader

An agreement has been signed between H. and E. Lintott Ltd., and William L. Riggs Co., of Tulsa, Oklahoma, to sell and ultimately manufacture the 'Safety Boy Flange Spreader', a tool for parting flanges on any pipeline installation. Lintott are one of the Ayling Industries Group, Ayling House, King's Road, Horsham, Sussex.

Heat and Vapour Seal

A new treatment 'Heat-Lok' for provision of a protective chemical blanket for hot immersion processing baths is offered by Pyrene Co. Ltd., Metal Finishing Division, Great West Road, Brentford, Middx. Reduced heating costs, improved working conditions and reduction in equipment maintenance are claimed for the new product.

CAB Powder

Telegraph Construction and Maintenance Co. Ltd., Mercury House, Theobalds Road, London W.C.1, makers of Telcothene polythene powder, can now supply CAB (cellulose aceto-butyrate) powder for dip coating in black, white and a number of colours.

People in the News

(*Continued from p. 866*)

treasurer is **Dr. T. L. Parkinson, B.Sc., F.R.I.C.,** of the Product Research Division, Beecham Foods Ltd.

The appointments took place at the 15th A.G.M. of the Group, after which the retiring chairman, **Mr. R. A. C. Isbell, A.Inst.P.,** of Hilger and Watts Ltd., gave a lecture on 'The design of optical instruments for chemical analysis.'

● **Mr. H. G. Ablett,** sales manager of the Industrial Division, Jenson and Nicholson Ltd., Stratford, London E.15, manufacturers of Robbialac paints, has been appointed a director of the company. He joined the firm in December 1957 after working for 10 years in I.C.I. Paint Division.

● **Professor Otto Hahn,** holder of a Nobel Prize, is to retire in the near future from his position as president of the Max Planck Society for the promotion of science in Göttingen. He is 81 next March. The Society have elected **Professor Butenandt,** another Nobel prize-winner, to succeed him. Professor Butenandt is a director of the Max Planck Institute for Biochemistry and a professor of the University of Munich.

● **Mr. R. E. Burnett, M.A.(Oxon), A.M.I.E.E., A.Inst.P.,** general manager of Marconi Instruments, has been elected to the board, and appointed managing director of the company.

NEW PATENTS

By permission of the Controller, HM Stationery Office, the following extracts are reproduced from the 'Official Journal (Patents)', which is available from the Patent Office (Sales Branch), 25 Southampton Buildings, Chancery Lane, London W.C.2, price 3s 6d including postage; annual subscription £8 2s.

Specifications filed in connection with the acceptances in the following list will be open to public inspection on the dates shown. Opposition to the grant of a patent on any of the applications listed may be lodged by filing patents form 12 at any time within the prescribed period.

ACCEPTANCES

Open to public inspection 27 January

Purification of plutonium solutions. Boyd, G. E., Adamson, A. W., Shubert, J., and Russell, E. R. **826 910**

Means for supplying solid material of granular or powder form. Babcock & Wilcox Ltd. **826 937**

Formation of coatings on titanium and alloys thereof. Pyrene Co. Ltd. [Addition to 823 928.] **826 912**

Separating paraffins from hydrocarbon oils. Edelenau GmbH. **826 942**

Polymeric amino organo vinyl ethers, and process for producing them. Rohm & Hass Co. **826 945**

Synthetic lubricants. British Petroleum Co. Ltd., Pethrick, S. R. and Sparke, M. B. **826 951**

Steroid esters and their preparation. Ciba Ltd. **826 953**

Producing fast dyeings on textile materials of aromatic polyesters. Farbwerke Hoechst AG. [Addition to 808 174.] **826 959**

Recovering deuterium. Stamicarbon NV. **826 962**

Hydroquinone compounds and process for their manufacture. Ciba Ltd. **826 917**

Production of stretched polyacrylonitrile filamentary material. American Cyanamid Co. **826 967**

Apparatus for removing impurities from molten metal by centrifugation. Pemetzrieder, G. **826 864**

α- and -δ-glutamyl peptides. Uclaf. **826 925**

Distillation column. Celanese Corp. of America. **826 947**

Fluidised bed reaction vessels. Laporte Titanium Ltd. **826 978**

Polymeric materials Due Pont de Nemours & Co., E. I. **826 979**

Method of producing essentially *cis* rubbery polyisoprene. Firestone Tire & Rubber Co. **826 918**

Apparatus for heat treating glassware. Pittsburg Plate Glass Co. **826 984**

Polymerisation of diolefins. Firestone Tire & Rubber Co. **826 990**

α-(Halophenoxy)-propionic acids and herbicidal compositions thereof. Boots Pure Drug Co. Ltd. [Cognate application 19 482.] **826 995**

Catalytic reforming of petroleum hydrocarbons. British Petroleum Co. Ltd., Moy, J. A. E., and Burbidge, B. W. **827 000**

Apparatus for regulating discharge of liquid from a vessel. Baier, O., Baier, L., Baier, W., Baier, W., Schlumprecht, L., and Baier, W. [trading as Baier Komm.-Ges Webastowerk. W.] **827 001**

Preparation of extrusion material from linear polyesters and linear polyamides. Onderzoekingsinstituut Research NV. **826 920**

Manufacture of double-base propellant grains. Hercules Powder Co. **827 012**

Method of producing metal-coated non-metallic particles. Sherritt Gordon Mines Ltd. **827 016**

Method and apparatus for determining the quantity of hydrogen in metal samples. Triggs, W. W. (National Research Corp.) **827 018**

Method and apparatus for centrifuging fluids. Fromagerie Lab. **826 874**

Apparatus for determining the specific surface area and the grain shape of a granular substance. Fischer AG., G. **826 878**

Methods for production of metallic-ceramic materials. Svenska Metallverken AB. **826 894**

Salts of two α-monoalkyl-N-trityl glutamates. Uclaf. [Divided out of 826 925.] **826 926**

Aromatic sulphonyl chlorides. Merck & Co. Inc. [Divided out of 826 921.] **826 922**

Ferro-titanium and the manufactures thereof. Holland & Co. Ltd., R. G. **826 983**

Catalytic processes for the production of stereospecific polymers and catalysts for use in such processes. Bataafsche Petroleum Maatschappij NV., De. **826 908**

Benzothiadiazine derivatives. Merck & Co. Inc. [Divided out of 826 921.] **826 923**

Sulphonamides. Merck & Co. Inc. [Divided out of 826 921.] **826 924**

Process for reforming hydrocarbon fractions boiling in the gasoline range. Universal Oil Products Co. **826 909**

AMENDED SPECIFICATION

On Sale 20 January

Trinuclear polymethine dyes containing a pyrryl indolyl or pyrrodolyl nucleus and photographic emulsions containing such dyes. Kodak Ltd. **756 226**

DIARY DATES

MONDAY 14 DECEMBER

Inst. Physics—Manchester: The University, 7 p.m. 'The aesthetic design of scientific instruments', by R. H. Litherland.

S.C.I.—Leeds: Houldsworth School of Applied Science, University of Leeds, 7 p.m. 'Structure and properties of some inorganic polymers', by N. L. Paddock.

S.C.I.—London: 14 Belgrave Sq., S.W.1, 5.30 p.m. 'Insect control by gamma irradiation', by P. B. Cornwell.

TUESDAY 15 DECEMBER

Plastics Inst.—Leeds: St. Mark's Hse., 186 Woodside Lane, 7.15 p.m. 'Electrical heating for the plastics industry', by Dr. A. Westerman.

WEDNESDAY 16 DECEMBER

Inst. Fuel—London: Inst. Civil Engineers, Gt. George St., S.W.1, 5.30 p.m. Symposium on 'The uses of liquefied petroleum gases'.

Plastics Inst.—Newcastle: Eldon Grill, Grey St., 7 p.m. Film evening.

S.A.C.—London: The Feathers, Tudor St., E.C.4, 6.30 p.m. Discussion meeting of Microchemistry Group.

THURSDAY 17 DECEMBER

S.A.C.—Nottingham: The Technical College, 7 p.m. Discussion on 'Kjeldahl nitrogen determinations'.

FRIDAY 18 DECEMBER

S.C.I.—London: 14 Belgrave Sq., S.W.1, 6.30 p.m. 'Some aspects of forensic science', by Dr. F. E. Camps.

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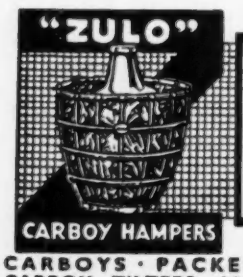

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KING'S PATENT AGENCY, LTD. (B. T. King, A.I.Mech.E., Patent Agent). 146a Queen Victoria Street, London, E.C.4. City 6161. Booklet on request.

The Proprietor of British Patent No. 737822, entitled "METHOD OF SEPARATING DISPERSED MATTER FROM FLUID MASSES", offers same for licence or otherwise to ensure practical working in Great Britain. Inquiries to Singer, Stern & Carlberg, 14 E. Jackson Blvd., Chicago 4, Illinois, U.S.A.

The Proprietors of British Patent No. 757,484 for "IMPROVED METHOD AND APPARATUS FOR THE REDUCTION OF FATTY MATERIALS BY HYDROGENATION", desire to enter into negotiations with a firm or firms for the sale of the patent or for the grant of licences thereunder. Further particulars may be obtained from Marks & Clerk, 57 & 58 Lincoln's Inn Fields, London, W.C.2.

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1, 8-Diaminooctane
1, 9-Diaminononane
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1, 7-Dibromoheptane
1, 8-Dibromooctane
1, 9-Dibrononane
1, 10-Dibromodecane
1, 11-Dibromoundecane
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2, 5-Dibromo-hexene-3
2, 5-Dibromohexane
1, 6-Dichlorohexane
*1, 7-Dichloroheptane
1, 8-Dichlorooctane
1, 9-Dichlorononane
1, 10-Dichlorodecane
1, 4-Dichlorobutene-2
2, 5-Dichloro-hexane-3
2, 5-Dichlorohexane
2, 3-Dichloro-1, 4-naphthoquinone
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1, 8-Dimethoxyoctadien-1, 7-diyne-3, 5
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Dimethyl thapsate
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Dimethyl dodecamethylene dicarboxylate
3, 8-Dimethyloctanediol-2, 7
2, 7-Dimethyloctadiyne-3, 5-diol-2, 7
3, 8-Dimethyldecanediol-3, 8
3, 8-Dimethyldecadiyne-4, 6-diol-3, 8
2, 5-Dimethyl pyrrole
1, 6-Dimorpholinyl-hexadiyne-2, 4
Di-n-decylamine
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Hexadecanediol-1, 16
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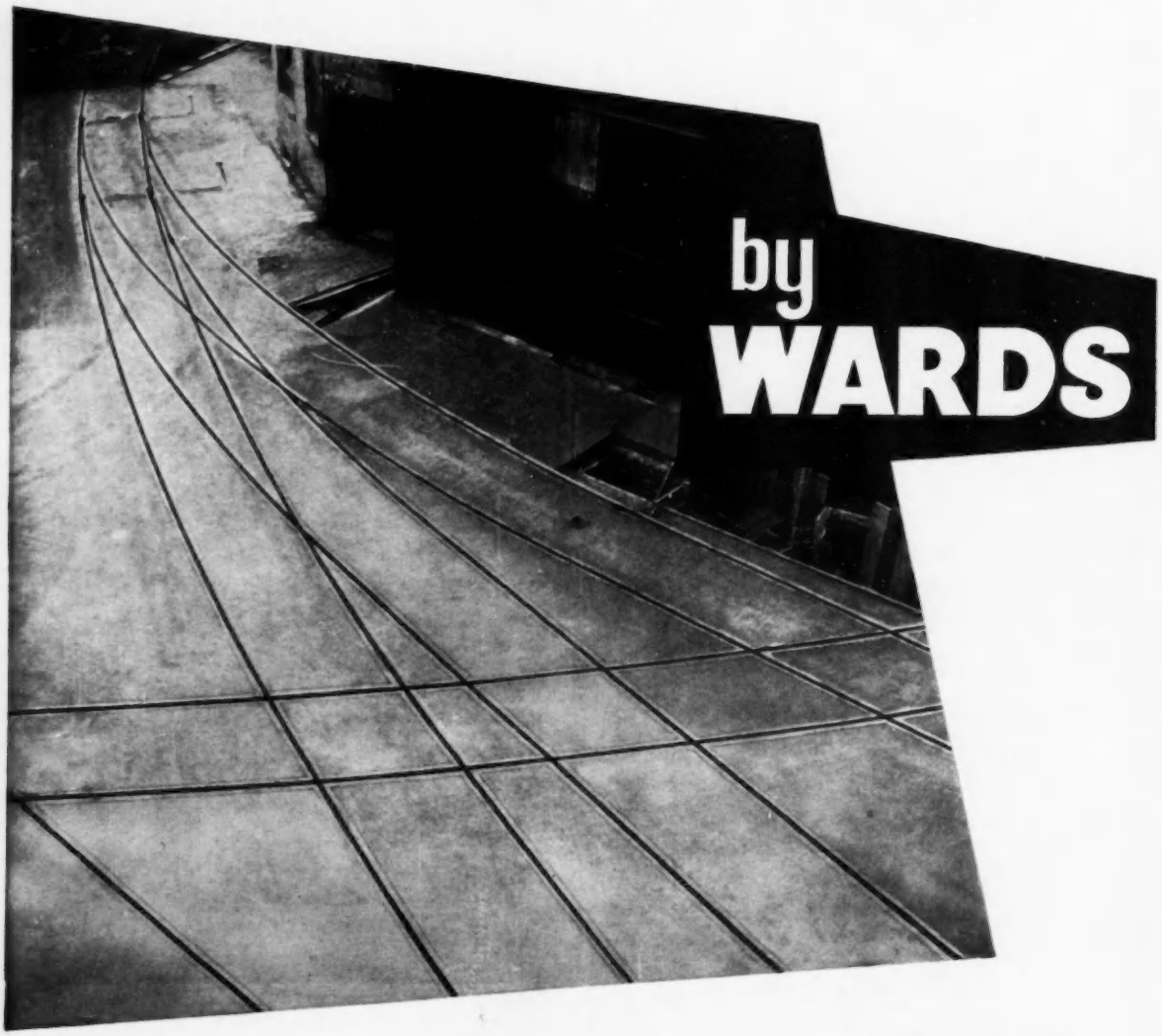
Lauryl iodide
Margaronitrile
beta-Mercaptoethylamine HCl;
5-Methoxy-1-chloropentene-2
1-Methoxybuten-1-in-3
5-Methoxy-3-chloropentene-1
3-Methylheptanediol-2, 4
3-Methyl-5-ethylheptanediol-2, 4
3-Methylpentanediol-2, 4
3-Methyl-5-ethylnonanediol-2, 4
2-Methyltetrahydrofuran
1-Methyl-1, 2, 3, 4-tetrahydroquinoline
4-Methyltetrahydropyran
2-Methyl-1, 2, 3, 4-tetrahydroisoquinoline
n-Nonadecylic alcohol
Nonadecylic acid
Nonamethylene dinitrile
n-Nonadecanoic acid nitrile
Nonanediol-1, 9
Octamethylene dinitrile
*Octanediol-1, 8
n-Pentadecyl alcohol
Pentadecylic acid
Pentadecandioic acid dimethylate
Pentamethylene dinitrile
n-Pentadecanoic acid nitrile
*Pentadecanediol-1, 15
*Pimelic acid
Pivalic acid
*Pyrroline
trans-Stilbene
Suberic acid
Serotonin creatinine sulphate
Tetradecandioic acid dimethylate
1, 2, 3, 4-Tetrahydroisoquinoline
1, 2, 3, 4-Tetrahydroquinoline
Tetrahydropyran
*Tetradecanediol-1, 14
Tridecylic acid
*Thapsic acid
*Tridecylic alcohol
n-Tridecanoic acid nitrile
Triacosylic acid
n-Triacosylic alcohol
n-Triacosanoic acid nitrile
Tridecandioic acid dimethylate
Tri n-octylamine
Undecanediol-1, 11
DL-Tryprophane (pharm:)
Undecandioic acid dimethylate
Undecamethylene dinitrile

* Not yet available

TRACKWORK

For Road & Rail Access



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